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UP "MERSEYSIDE" EXPRESS ON WHITMORE TROUGHS, L.M.S.R.

4-6-0 No. 6117, "WELSH GUARDSMAN."

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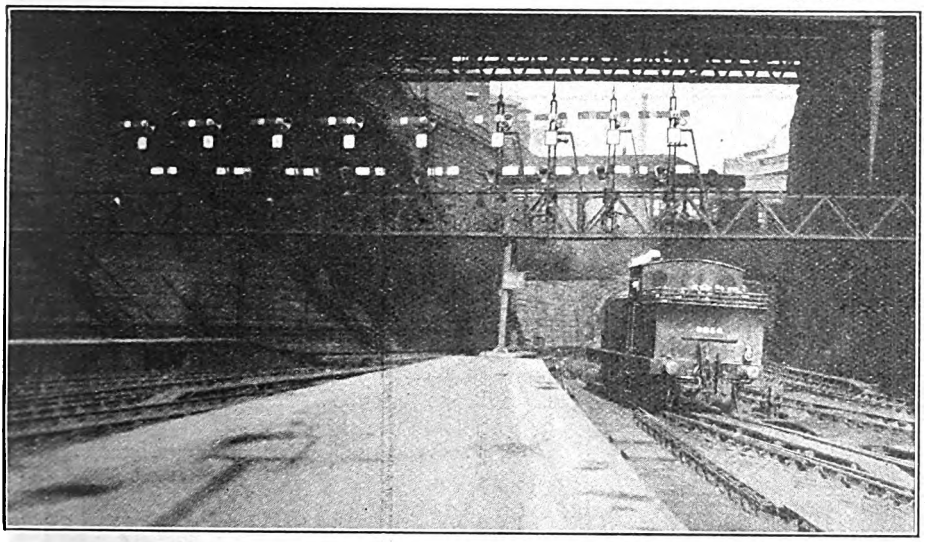

GENERAL VIEW FROM QUEEN STREET PLATFORMS, SHOWING MAIN SIGNALS, ETC.

Notable Railway Stations and their Traffic.

QUEEN STREET, GLASGOW, LONDON AND NORTH EASTERN RAILWAY.

By J. F. GAIRNS, M.Inst.T., M.I.Loco.E.

IN dealing with this station one is faced with two problems: (1) that it is fashionable to compare Queen Street (usually in company with Buchanan Street) very unfavourably with the other great Glasgow termini, Central and St. Enoch, and (2) that Mr. J. Calder, the last General Manager of the North British Railway, and, since grouping, General Manager, Scotland, London and North Eastern Railway, told the story of Queen Street so well in the pages of the RAILWAY MAGAZINE for February, 1901, that there is really not a great deal more to be said now, even after the lapse of almost 29 years. There are, however, two very good reasons for dealing with the subject anew, firstly, that Queen Street is now the only big Scottish station which has not been the subject of a modern article in our pages, while there must be a very large proportion of our readers to whom the original article is unknown, and, secondly, because, whatever its deficiencies, Queen Street deals with a substantial part of Glasgow's rail traffic and is a notable station by virtue of its traffic, though it may be wanting in architectural beauty, lack the brightness and neatness that go with ample space and modern reconstruction, and may justifiably be regarded as a somewhat dismal and unattractive place. It has to be remembered, however, that as it is most awkwardly situated, expansion is entirely out of the question except at formidable expense, and it is difficult and troublesome to work. There is, however, one redeeming feature, that but little of the station is actually visible outside, most of it being hidden by the Queen Street Station Hotel on the one side and by office buildings, to which a history attaches, on the other.

And now, having made these admissions, and forestalled certain uncompli-

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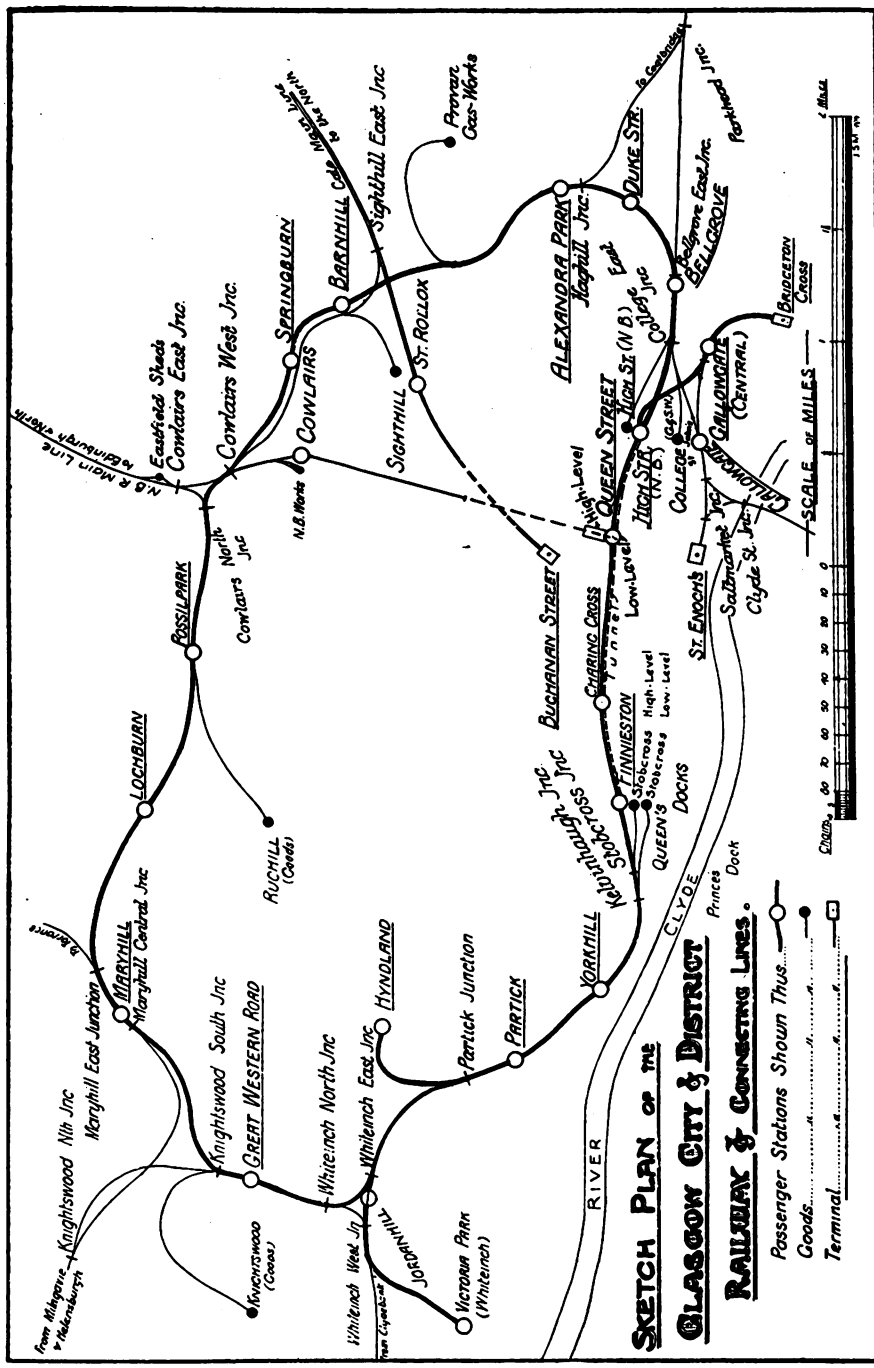

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mentary remarks, it is proposed to show that, despite its drawbacks and notwithstanding its operating inconvenience, Queen Street is fully entitled to rank with other and more attractive terminal stations in the description "Notable," while its substantial traffic includes many interesting features, covers many important train services and involves unusual methods of operation.

So far as history and development are concerned, it is necessary to quote appreciably from Mr. Calder's article, which, in the main, applies to-day even in regard to general description. His very first sentence, "Queen Street may well rank amongst the 'Notables' were it for no other reason than that no engine ever brings its train into the High Level Terminus," is, however, no longer correct. The main station (there is a low-level section below) is still at the foot of a 1 in 42 incline in tunnel to Cowlairs, but the method in force in 1901, and for many years previously, of bringing trains down under control of special brake trucks and without engines has been discontinued for many years. There are, however, many of us who can remember the days when, while tickets were being collected at Cowlairs, the engine placed two or three brake trucks at the head of the train and then proceeded to the rear to give a push as far as the summit of the incline, the remainder of the journey being made by gravity. Engines did, however, go down to Queen Street, though not with trains, as they were required to bring outward trains up the grade with the assistance of a cable worked by a famous old stationary engine accommodated in a building which can still be seen at the end of the platform at Cowlairs. Nowadays, however, 0-6-2 tank engines are used for assisting departing trains, these being at the rear, and fitted with slip couplings, so that they can be detached at Cowlairs without stopping in the case of trains not booked to call there. Passenger trains descending the incline are worked by the train engines and controlled by the continuous brake. Goods lifts are also worked down the incline by engine, but such lifts must have a 20-ton brake van on the rear and a sufficient number of wagon brakes pinned down. Each goods lift is limited to 14 wagons and the journey from Cowlairs to Queen Street must not be made in less than 7 minutes.

Queen Street was built as the Glasgow terminus of the Edinburgh and Glasgow Railway, and was opened on February 18, 1842, and in this connection I cannot refrain from repeating Mr. Calder in quoting the following from a guide book issued in that year:—

"On emerging from the subterranean recesses of the tunnel, the astonished traveller finds himself transported into an almost fairy palace; this is the passengers' shed at the Glasgow Terminus. This spacious and splendid erection, which is elegant as well as commodious, is furnished with a beautiful passengers' parade on each side, covered in by a roof supported on forty-eight columns, arranged in double rows, besides the principal roof between them, a light and elegant fabric of the great span of 64 ft. The shed is upwards of 230 ft. in length, and, including the promenades on each side for the passengers, it is not less than 85 ft. in width. There is also a splendid booking office, with access to waiting rooms, and every other convenience for the accommodation of travellers."

I must also repeat Mr. Calder in his comment that "a period of thirty-five years, however, did much to change the views of the good folks of the industrial metropolis of Scotland with respect to the 'fairy palace,' for in a petition by the magistrates of Glasgow, lodged in Parliament in 1877, that august body stated, 'The Queen Street Station of the North British Railway is one of the most inconvenient and dangerous in the City of Glasgow.'"

Queen Street was then the Glasgow terminus of the North British Railway; it had become the scene of vastly increased traffic, and, in the course of years, any "pristine newness" it presumably possessed in 1842 had worn off. In 1877 powers were obtained for various improvements, including an enlargement of the station space, by opening up a portion of the tunnel at its mouth and widening the station practically to its present dimensions. The fact that it has been possible to deal with traffic without further enlargement is mainly due to the

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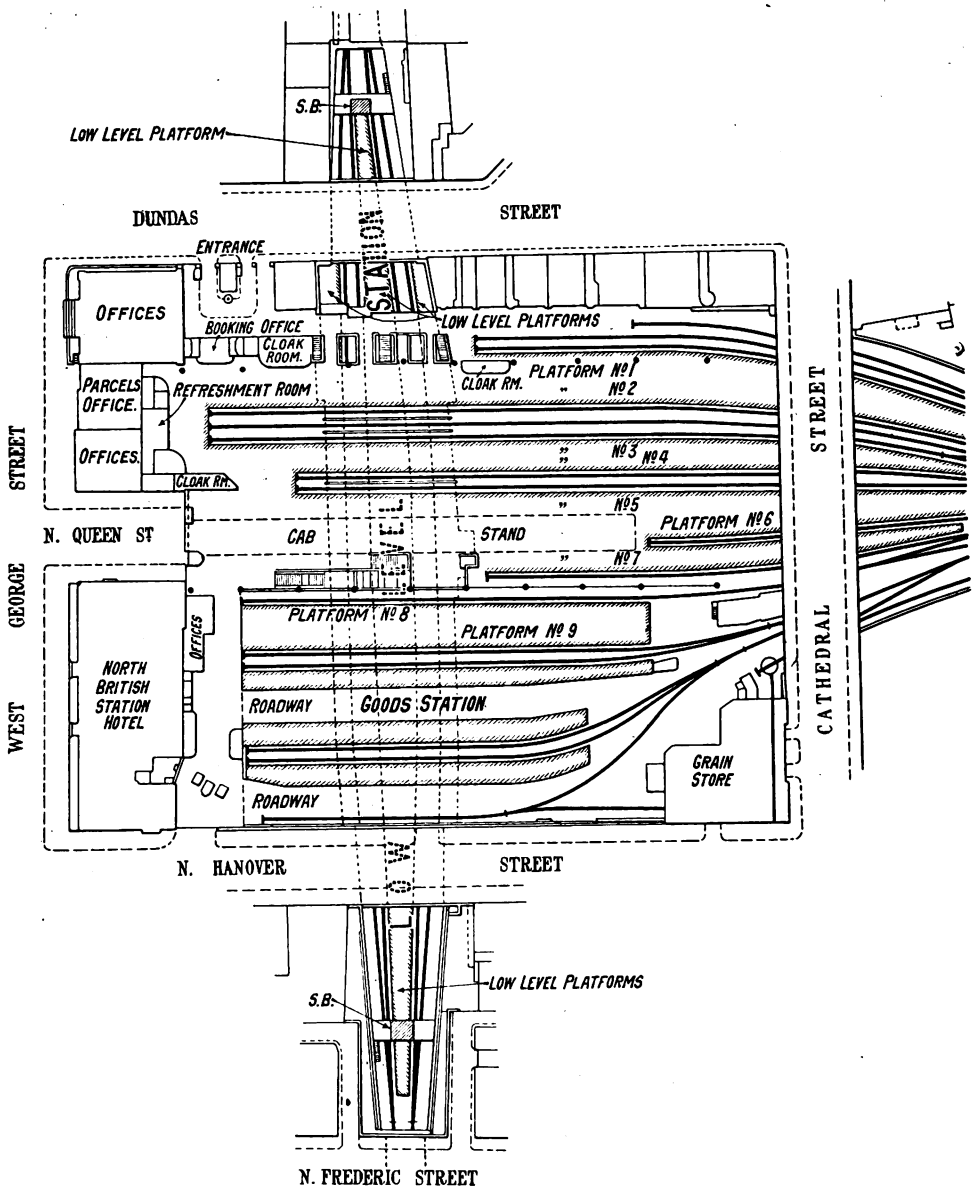

PLAN OF QUEEN STREET STATION, GLASGOW, L.N.E.R.

construction of the Glasgow City and District Railway, which provided the low level platforms brought into use in 1886.

The station is very well situated so far as Glasgow "centrality" is concerned, as it gives direct access to George Square, where is situated the General Post Office. Numerous tram routes pass through the Square, while several main thoroughfares are adjacent. The principal entrance is from West George Street, which forms one side of the Square, by means of a short street known as North Queen Street, between the well-known L.N.E.R. Queen Street Station Hotel and a building which accommodates the district offices and their departments.

For many users, however, the entrance on the Dundas Street side is the more important, especially as this serves the book-

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ing offices, etc. The main platforms are behind the office building and opposite the North Queen Street approach, though the goods station and two passenger platforms are behind the Hotel. The station area is otherwise bounded by North Hanover Street, where access to the goods station and parcels office is obtained. This thoroughfare, with Dundas Street, rises rather steeply to Cathedral Street, which crosses the station by a wide and rather high bridge. Cathedral Street represented the original limit of the station, but the opening up of the tunnel mouth already mentioned enabled platforms to be extended beyond the bridge, so that the tunnel commenced under a second and still higher bridge carrying Holmhead Street.

The office building mentioned was originally the Wardlaw Kirk, so named after the pastor of those days, the Rev. Dr. Wardlaw. In this connection, Mr. Calder may again be quoted as follows:—

"The property was acquired by the Edinburgh and Glasgow Railway Company some little time after the opening of the line, and was used as the head offices of that company until its amalgamation with the North British in 1865. For a considerable time after its change from religious to railway work, the structure remained known as 'The Kirk,' and in those days, when any member of the staff was summoned before the manager for the purpose of receiving a 'carpeting,' he made known the fact to his fellow-workmen by intimating that he 'had to appear at the Kirk to-morrow.'"

The hotel is a comfortable and well-equipped one, with 90 bedrooms and all usual accommodation. Though of the older style, it is favoured by many regular visitors to Glasgow, and ranks as one of the recognised first-class hotels in the city, apart from its use by rail passengers, who find it convenient to have a good railway-owned hotel adjacent to the station they have used or intend to use.

In the old Kirk building the ground floor accommodates, adjacent to the entrance from West George Street, a public telegraph office (with pneumatic tube connection to the G.P.O. across the Square and to the railway company's private telegraph office), the offices of the Locomotive Running Superintendent, and a room equipped for railway signalling classes and other staff-training purposes. The building is centrally open up to the roof, opening out into galleries which are reached from the bottom by a connecting stairway. The rooms on the first and second floors are tenanted by the District Superintendent and his staff.

Between the office building and North Queen Street is a range of premises accommodating the staff of the Chief of Police, Advertising Manager and Electrical Engineer, with cloak-room, season ticket office, etc., along the station approach. The roadway up North Queen Street is continued below the high arched roof of the station to form the main cab road between Nos. 5 and 6 platforms. To the left, more particularly behind Nos. 2 and 3 platforms, is the somewhat restricted circulating area, upon which may be noted the refreshment room, bookstall, tobacco and fruit stalls, ladies' waiting-room, lavatories, etc., and an entrance to the office building already considered. Behind the buffer stops of Nos. 2 and 3 platforms, between which there is a middle line, is a large train indicator.

A range of premises borders No. 2 platform as far as the buffer stops of No. 1 platform, which is substantially shorter. These include a somewhat restricted booking office, with passage-way on either side to the Dundas Street courtyard, various staff offices, and a Shop Parcels section, with another block comprising Stationmaster's Office and Ladies' Waiting Room. Behind these are the premises associated with the Dundas Street entrance, served by a pathway extending towards the buffer stops of No. 1 platform line.

The entrance from Dundas Street, probably more extensively used than that from North Queen Street, is through archways which accommodate a three-sided cab road and space for pedestrians. Enclosed by the cab road between the entrance and exit archways is a small building accommodating staff offices, while beyond the cab road access is given to the passageways alongside the booking office already mentioned and leading into the main station. The cab yard, which is covered in and lighted from above; has also several other booking windows along the walls nearest to the pathway behind the premises alongside No. 2 platform. Along one side of this pathway are book-

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Photo.] [*J. F. Gairns.*

OFFICE BUILDING AND STATION ENTRANCE FROM DUNDAS STREET.

stall and confectionery and other stalls, while on the other side are three sets of stairways (with collectors' boxes) leading down to the respective platforms of the Low Level station. At the end, and partially along the station wall beyond the siding paralleling No. 1 platform line, are further staff offices.

As will be seen from the plan reproduced, the platforms and lines are somewhat irregularly arranged. There are first two sidings beyond No. 1 platform line, while the main departure platform has No. 1 on one side and No. 2, much longer, on its other face. There is then a middle line, with No. 3 terminating level with No. 2. The next two platforms, Nos. 4 and 5, do not extend as far as Nos. 2 and 3. Then comes the cab road from North Queen Street. This is railed off from No. 5, all platforms at Queen Street being now closed. At the end is a horse and carriage dock (No. 6), and on the right a short platform (No. 7) available for van loading, etc., but not, of course, suitable for passenger train use. From the buffer stops of No. 7 the cab yard is railed off, though it has No. 8 platform line behind it. This platform, whose other face forms No. 9, is thus similarly hidden away behind the hotel, though it is in frequent use. Beyond it are the goods station premises. Along the side of the cab road away from No. 5 platform are further stairways to and from the Low Level platform.

The goods station is very restricted and includes only four lines. The first is immediately alongside No. 9 platform line and has a loading platform served by a cart road which also meets the needs of the platform for the next goods line. The latter is paralleled by a third line, having its own loading platform, served by an outer roadway beyond which is the fourth line extending round the depot to join the other lines towards the tunnel mouth.

The goods station is entered from North Hanover Street through a gateway with necessary offices adjacent, the road dividing to serve the respective loading platforms, as mentioned. The main goods and parcels offices are located immediately behind the Hotel and include a public parcels forwarding section immediately behind the end of No. 9 platform, with direct access to the loading platform of the first-mentioned goods station line. The goods station, except where there are premises above, has glazed roofing. Over a portion of it, however, are other premises, to be described, while a degree of artificial lighting is necessary.

As there are other London and North Eastern Railway goods depots in Glasgow, and in view of the very limited space available at Queen Street, the principal traffics dealt with now are beer and potatoes, with the business of the grain store, which is further down the yard alongside the Cathedral Street

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bridge. From the Parcels Forwarding Office a parcels and luggage overbridge extends across the passenger station, with hoists from the Parcels Department serving platforms Nos. 1 and 2 and Nos. 3, 4 and 5, and the Low Level Station.

Partially over the goods station is the Parcels Delivery Department, which has its own entrance gateway and yard higher up North Hanover Street than the goods station entrance. The inclination of North Hanover Street covers the difference of level. The premises include a covered yard with platforms against which vans can be backed, with storage space, etc. A hoist gives access to the main station near the ends of Nos. 8 and 9 platforms.

Between the Goods Station entrance and the Parcels Delivery Department is a general beer store, while beyond the Parcels Delivery Department yard are premises rented by Younger & Company for beer traffic. These have a private hoist connecting with the goods station below on the platform where beer traffic is chiefly handled. Finally, at the corner of North Hanover Street and Cathedral Street is the Grain Store, a seven-storey building extending down to rail level, the third storey being at road level. The passenger and goods station hoists are all electric, except those to the Low Level Station, which are hydraulic.

Returning to the main station, a few further points call for attention. As will be seen from the plan, all passenger station lines lead to the tunnel mouth under Holmhead Street, and as space is very restricted, shunting operations, except for engines and two or three vehicles, entail entering the tunnel. There is, however, a short shunting neck for the goods station, so that movements there do not usually affect the passenger lines. Signalling is centralised in the box which spans the lines beyond Cathedral Street bridge. Practically all signalling is concentrated upon the signal bridge shown in one of the photographs reproduced, this including starting signals for all lines and splitting signals for arriving trains. There are three splitting signals situated about 20 yards within the tunnel at Queen Street end, one of which indicates for platforms Nos. 1 and 2, Mid Road and Back Road, another for platforms Nos. 3 to 9 inclusive, while the remaining one indicates for the goods side of the station.

The Low Level Station forms part of the Glasgow City and District Railway. This system of lines was very fully described by Mr. C. E. S. Littlejohn in the June and July, 1914, issues of the RAILWAY MAGAZINE, and is of very great importance in considering the London and North Eastern Railway facilities in Glasgow. A map, published with that article, is now reproduced. As will be seen, it allows of almost any train service being directed through Queen Street Low Level, and, if need be, even principal expresses could be so diverted, though the absence of terminal facilities would render this undesirable except of necessity. By the construction of this line, however, it became practicable to route any trains of a suburban character or

Photo.] [*J. F. Gairns.*

PART OF CIRCULATING AREA.

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otherwise suitable to the "Underground" line, with the further advantages that terminal work could be transferred to Bridgeton Cross and that passengers were able to join or leave trains at stations other than Queen Street if more convenient. In practice, most trains of a suburban character, together with most of the Helensburgh, Craigendoran and Balloch trains and occasionally those for the West Highland line, are routed *via* Queen Street Low Level. Many of them terminate at Bridgeton Cross, but a usual practice is for trains from the east to continue to termini such as Hyndland and Whiteinch (Victoria Park), those from the west going to Bridgeton Cross or continuing by other routes *via* Bellgrove.

Queen Street Low Level Station, therefore, while it has no terminal facilities, deals with many more trains than does the High Level Station above. It is approached through tunnels at each end, and is, of course, covered for almost the whole of its length by the station above. Between the tunnels each line divides into two, a central island serving one in each direction, while two side platforms serve the loop lines. This duplication of tracks enables a train to be held up for about 10 minutes for parcels loading or unloading, &c., while traffic in the same direction can proceed on the alternative line, or a following train can be brought into the station before that in advance has left. The platforms are fairly long, with five sets of stairways to the station above. At each end there is a signal cabin mounted on a bridge, and in each case only one of the splitting admission signals at either end is duplicated on the platform side of the bridge. This is due to the fact that in each instance only one of the signals is visible to platform staff over the bridge, and the other is, therefore, duplicated in back view for staff information.

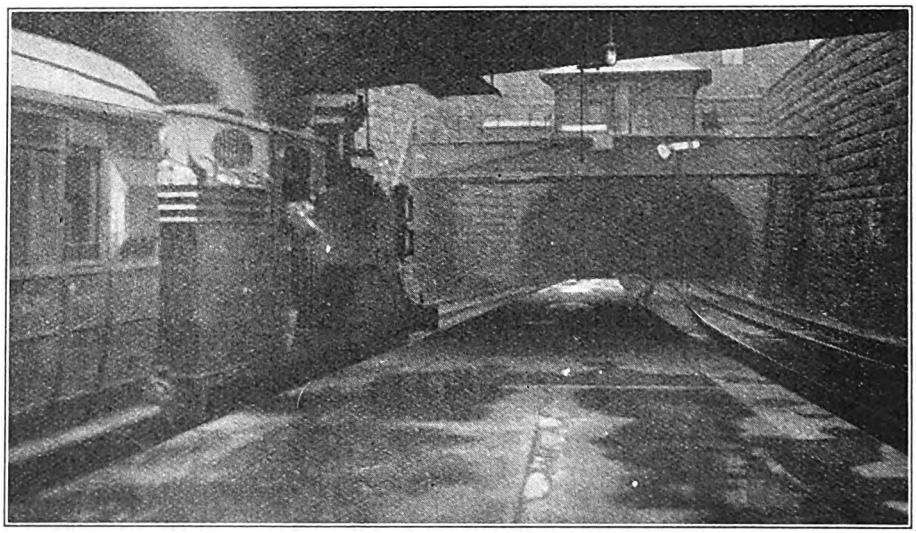

Photo.] WEST END OF LOW LEVEL STATION. [*J. F. Gairns.*

As a principal Glasgow terminus and in view of its Low Level suburban services, Queen Street is necessarily a busy place practically all day and is especially so on Saturdays and at local and general holidays. There are times, in fact, when its limited circulating space and restricted booking accommodation are severely taxed. It is, however, worked very well under the circumstances, and it is but rarely that congestion reaches the difficult stage. Over 60 trains enter the High Level Station daily and about the same number leave, though train movements are necessarily more numerous owing to the fact that arriving engines have to go up to Cow-

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lairs to turn and then come back for trains, while banking engines have to be manipulated and shunting operations are fairly numerous. In the Low Level Station trains are not terminating, but there are about 120 in each direction daily. On Sundays, though many more trains are now run than was the case even five years ago, the numbers are still comparatively small, about 12 arriving and 12 departing, High Level, and 34 each way, Low Level. It is estimated that about 50,000 passengers use the station daily, though these numbers are vastly increased at busy periods. About 350,000 parcels are received annually and about 800,000 forwarded. There is also a fair amount of fish, milk, horsebox and other traffic.

The staff employed at Queen Street passenger station is under Mr. Jackson, Stationmaster, and numbers 187, and during the summer months this number is considerably augmented. There are 3 clerks, 7 station inspectors, 5 station foremen, 5 leading porters, 51 porters, 30 collectors, 6 passenger shunters, 28 passenger guards, 11 signalmen, 2 signal lads, 4 waiting-room attendants, 5 carriage lampmen and 30 carriage cleaners, employed in dealing with passengers, luggage, reservation of seats and compartments and overtaking other duties in connection with passenger train working and carriage cleaning. The goods handling staff, consisting of 2 goods foremen, 2 working foremen, 2 goods shunters, 2 checkers, 8 goods porters, 2 gatemen, is also under Mr. Jackson.

The Booking and Season Ticket Offices, controlled by Mr. Weston, Passenger Agent, employ 17 male and 2 female clerks, with additional seasonal appointments durnig the summer months.

Nearly 3,000,000 tickets—ordinary, season, &c.—are issued annually, and this department also deals with sleeping-berth reservations, as well as dining-car receipts, special parties, &c. Bookings are available for all parts of Scotland and England, and to most of the holiday resorts on the Continent.

The Parcels and Left Luggage Offices are under Mr. Taylor, Parcels and Goods Agent, whose staff number 152, comprising the following:—36 male and 1 female clerks, 1 office cleaner, 8 parcel foremen, 6 leading porters, 42 parcel porters, 9 cloakroom attendants, 3 excess luggage attendants, 1 cartage foreman, 1 working foreman, 19 parcel vanmen, 21 parcel van lads, 3 parcel motor drivers and 1 stable lad, while there are 20 horse vans and 1 motor van in use for the collection and delivery of parcels traffic.

Naturally, the express trains to and from Edinburgh are the most important dealt with at Queen Street, as might be expected, seeing it was for this traffic that the station was first erected. This importance is not, however, entirely due to the regular express service to and from Edinburgh, but is equally attributable to the fact that so many of these trains include through carriages or connect with services to and from various towns in England and Scotland of substantial traffic importance. There is, indeed, a fair volume of traffic by the London and North Eastern Railway route between London and Glasgow, though for through passengers this route is appreciably longer than the more direct London Midland and Scottish routes. To Newcastle, York, Leeds and a number of other places the London and North Eastern Railway route, which involves passing through Edinburgh, is a good one, and the train services thus involved are extensively favoured. There are also trains from Queen Street to Dundee and Aberdeen, some running independently as far as Dundee, if not throughout, while other important services are those to Fife Coast resorts, to Larbert and Stirling and to the West Highland line. At the Low Level Station there are also the numerous trains to Craigendoran, for the Clyde steamers, and to Balloch, for Loch Lomond, without taking into account a plenitude of trains of a local and suburban character.

In the case of the main Edinburgh route, it must be remembered that Falkirk, Grangemouth and Bo'ness call for extensive railway facilities, and for this reason quite a number of the expresses call at Polmont (sometimes Falkirk High or Manuel) to make connections to and from these towns. Linlithgow is also an important intermediate station. Hence, it follows that there are only two or three actual non-stop trains between the two Scottish capital cities, but quite a number

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which call only once or twice intermediately.

Apart from stopping trains, the first to leave Queen Street on this route is the 7.44 a.m. restaurant car express (four stops). There is another express at 8.35 a.m. (three stops) in advance of the 8.55 a.m. (two stops), which from Edinburgh forms part of the second portion of the 10.15 a.m. express to London. The restaurant car, in fact, goes through from Queen Street, while the train also includes through carriages to Harwich and Southampton Docks in connection with cross-Channel steamers.

At 10.5 a.m. the well-known "Queen of Scots" all-Pullman express leaves for London, booked in 62 minutes to Edinburgh with one intermediate stop. This is followed by the 10.11 a.m. semi-fast train with Pullman restaurant car. At 11.51 there is, on Wednesdays and Saturdays, an express stopping only at Polmont, running as a relief to the 12 noon restaurant car express (one stop) for Edinburgh, Newcastle, York and Leeds, with through carriages to Scarborough, London and Penzance. At 12.25 p.m. the Lothian Coast express (with Pullman restaurant car) leaves on Saturdays for North Berwick and Gullane (62 minutes to Edinburgh, one stop). At 12.50 there is a Saturday express in advance of the daily 1 p.m. restaurant car express for Edinburgh, the former making one stop and the latter being a non-stop to Haymarket, Edinburgh. On Saturdays there are express or fast trains for Edinburgh at 1.58 and 2.4 p.m. in place of the 2 p.m. on other days.

Except on Saturdays the Lothian Coast express (with Pullman restaurant car) leaves at 3.50 p.m. non-stop to Waverley in 60 minutes, replaced on Saturdays by the 3.50 p.m. ordinary train. The 4 p.m., non-stop to Haymarket, is the important Glasgow-Leeds restaurant car express, with through carriages for Sheffield. The 4.55 p.m. is still another restaurant car express for Edinburgh (three stops), and there is a further one at 6 p.m. (five stops). At 8.25 p.m. there is an ordinary express for Edinburgh (three stops), and at 9.45 p.m. there is a 60-minute express (conditional stop at Polmont), which conveys sleeping cars and through carriages from Glasgow to London, also those from Fort William. Finally, there is the 10.40 p.m. express for Edinburgh, with modified times on Saturdays. Besides these trains there are the 6.25 a.m., and 5.11 and 7.45 p.m. stopping trains for Edinburgh, the 11.16 a.m. and 2.50 p.m. trains which make part of the journey and then continue behind an express, and several trains which run to Dundee,

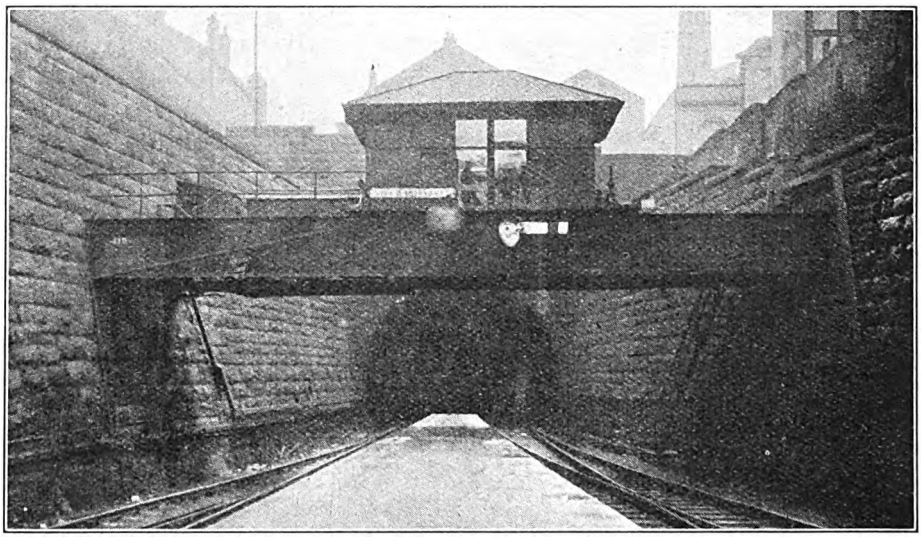

Photo.] EAST END OF LOW LEVEL STATION. [*J. F. Gairns.*

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Grangemouth, etc., or terminate locally, in order to provide further facilities for intermediate stations.

In the Aberdeen direction the principal trains are the 7.57 a.m. (to Dundee *via* Tayport); 9.35 a.m., with through carriages for Aberdeen transferred at Dalmeny to the 10.15 a.m. Edinburgh-Aberdeen restaurant car express, while the remainder of the train proceeds to Crail ; 11.30 a.m. Saturdays only to Leven but connecting with the 12.52 p.m. Saturday Edinburgh-Aberdeen restaurant car express ; 12.10 p.m. to Dundee ; 1.15 p.m. to Dundee with through carriages for Aberdeen ; 4.10 p.m. Fifeshire Coast express to Dundee ; 4.20 p.m. to Thornton Junction ; 5.36 p.m. to Dundee, with through carriages for Aberdeen, and 7 p.m. to Thornton Junction in connection with the 8.10 p.m. Edinburgh-Dundee train.

Other services at the High Level station are the 8.20 a.m., 11.45 a.m. (Wednesdays and Saturdays only), and 4.29 p.m. to Falkirk and Grangemouth ; 9.2 a.m., 1.32, 1.52 (Saturdays only), 4.47, 7.36 and 10.2 p.m. to Larbert and thence to Alloa or farther towards Perth ; a fair number of trains to Lennoxtown or onwards to Aberfoyle, and the West Highland trains, notably the 5.55 a.m. with the London sleeping car and through carriages, 11.23 a.m. with Edinburgh-Mallaig carriages, and 3.43 p.m.

On the arrival side there are trains due at 9.37 a.m. from Thornton Junction ; Fifeshire Coast express, 9.45 a.m.; 10.44 a.m. with through carriages from Aberdeen ; 12.46 p.m. from Dundee *via* Crail ; 4.56 p.m. from Arbroath, combined at Dalmeny with the 12.45 p.m. from Aberdeen ; 5.29 p.m. (Saturdays only) from Crail ; 6.6 p.m. from Thornton Junction ; 8.23 p.m. from Dundee with through carriages from Aberdeen, and 10.6 p.m. from Thornton Junction.

From Edinburgh direct the principal trains are those due at 5.30 a.m. (with the London-Glasgow and London-Fort William sleeping cars, etc., which latter go forward on the 5.30 a.m. from Cowlairs) ; 7.33 a.m. in connection with the 8.25 p.m. from King's Cross, 8.37 a.m. (Mondays only); 8.54 a.m. (restaurant car and through carriages and sleeping car from King's Cross at 10.25 p.m. the previous night) ; 9.53 a.m. Lothian Coast express (with Pullman restaurant car) ; 10.9 a.m. (non-stop from Haymarket) ; 11.14 a.m. (from Leith with through carriages from Edinburgh to Mallaig) ; 12.20 p.m.; 1.25 p.m. (Saturdays only) ; 2.4 p.m. (restaurant car from Leith) ; 3.7 p.m. (Saturdays only) ; 3.14 p.m. (Leeds-Glasgow restaurant car express, with through carriages from Sheffield) ; 5.4 p.m. (restaurant car, non-stop from Haymarket) ; 6.14 p.m., 7.33 p.m. (restaurant car and through carriages from King's Cross at 10.5 a.m.) ; 8.44 p.m. (down "Queen of Scots" Pullman Car express) ; 10.15 p.m. (restaurant car from Leeds to Glasgow, with through carriages from Southampton and Scarborough) ; 11.0 p.m., with through carriages from King's Cross ; and 11.56 p.m. (Saturdays only).

There are also the trains due at 10.17 a.m. from Perth ; 2.16 p.m. (Saturdays only) from Dollar and Alloa ; 3.39 p.m. from Milnathort, Kinross and Alloa ; 5.58 p.m. (Saturdays only) from Alloa ; and 6.49 and 10.33 p.m. from Perth, together with the West Highland trains due at 1.56 p.m., 5.44 and 8.17 p.m. (Saturdays only) or 8.28 p.m. (not Saturdays) and 9.12.*

There are, of course, several other trains of a local or stopping character, with the trains on the Aberfoyle route, which bring the totals up to those mentioned earlier.

At the Low Level Station there are several interesting services. On Saturdays two unusual items are the trains due at 7.28 and 10.3 p.m.—expresses from Edinburgh *via* the direct (Polmont) route, which go to the Low Level instead of the High Level Station, though their times (with one intermediate stop) are only 68 and 67 minutes respectively. There are also the Edinburgh trains *via* Bathgate, notably those due at Queen Street at 8.42 a.m. (from Bathgate), 9.51 a.m. (from Edinburgh), 10.15 a.m. (semi-fast from Edinburgh, on Saturdays only), 12.28 p.m. (from Edinburgh), 2.7 (express from Edinburgh, Saturdays only), 2.52 p.m. (from Bathgate on

* These convey the through carriages and sleeping cars from Fort William to London, and through carriages from Mallaig to Edinburgh, unless these vehicles are transferred to the Edinburgh train at Cowlairs without coming into Glasgow.

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Saturdays), 3.35 p.m. (from Edinburgh), 6.23 p.m. (from Edinburgh), 6.34 p.m. (from Bathgate), 8.24 p.m. (from Edinburgh, semi-fast), 9.55 p.m. (from Bathgate on Saturdays) and 10.47 p.m. (express). There are also trains for portions of this route. Similarly, Queen Street Low Level has departures at 6.32, 7.56, 10.35 and 12.2 (Saturdays only) a.m., and 3.10, 5.14 and 7.57 p.m. for Edinburgh, and 1.25 (Saturdays only), 4.58 (not Saturdays), 7.13 (Saturdays only) and 10.15 (Saturdays only) for Bathgate, together with trains for part of the route only, as well as to and from Hamilton.

These trains usually continue through or start from local terminals in western Glasgow, such as Hyndland, and the same applies to various local services (which need not be set out in detail) from Hyndland, &c., to eastward destinations, and from Bridgeton Cross, &c., to westward destinations, with some trains which make comparatively long journeys between eastern and western local terminals, calling at Queen Street about mid-day. Thus there are trains westward to Clydebank, Milngavie, Victoria Park (Whiteinch), &c., as well as Hyndland, and eastward to Airdrie, Coatbridge and Hamilton, besides trains to Springburn, Kilsyth, Torrance, Bonnybridge, &c., and occasional trains on other routes using the Low Level instead of the High Level Station at Queen Street.

One of the busiest routes is, however, that to Dumbarton and Craigendoran or Balloch, and in the case of services connecting with Loch Lomond steamers at Balloch and especially with Clyde steamers at Craigendoran, it is quite usual for reliefs to be run in considerable numbers. Many of these trains are, too, more or less fast, and the following may be specifically mentioned:—To Craigendoran and in most cases Helensburgh, 6.30, 7.55, 8.35, 9.20, 10.23, 10.35, 11.37 a.m., 12.0 noon, Saturdays excepted, 12.15 (Saturdays only), 1.0 (Saturdays only), 1.5 (Saturdays only), 1.10, 1.25 (Saturdays only), 2.4 (Saturdays only), 2.14 (Saturdays only), 2.20, 3.10, 4.0, 4.20, 5.8, 5.30, 6.5, 7.15, 7.55, 9.0, 9.20, 9.45 (Saturdays only) and 10.50 p.m., besides stopping and other trains for portions of the route; to Balloch and Loch Lomond, 7.25, 9.26, 10.50, 1.48, 1.55 (Saturdays only), 2.44 (Saturdays only), 3.25 (Saturdays only), 4.4 p.m. (not Saturdays), 5.43, 8.40 (Saturdays only) and 10.20. Many of these trains are quite fast, making only two or three calls after Partick, and one or two are actual expresses through to Cardross, Craigendoran or Helensburgh, though it is only very exceptionally that Dumbarton is passed. There is, of course, a similar service back to Glasgow, adapted to the period of the day and the steamer and other connections provided. As a rule, these trains make Bridgeton Cross their actual terminus, but there are several variations. Extras are, moreover, frequently called for at busy times, and especially on public holidays, owing to the tremendous volume of the Clyde steamer traffic on these occasions. The passing loops in the Low Level Station are particularly valuable at such times, as these trains often involve a good deal of luggage handling, though in the case of some of the principal services there is a restriction upon the conveyance of heavy luggage. On Saturdays and public holidays, moreover, the numbers of passengers are frequently very large.

Even now it cannot be said that Queen Street is a busy station on Sundays, though the situation is now vastly different from what it was a few years ago. There are only two trains in the Dundee direction, 1.35 p.m. to Anstruther and 7.15 p.m. to Anstruther, from Queen Street High Level, with return trains due at 11.52 a.m. and 9.30 p.m. On the direct Edinburgh line there are trains at 9.50 (through carriages and restaurant car to London), 11.30 a.m., 2, 6.10 and 9.15 (sleeping cars to London) p.m., and return trains due at 8.49 a.m. (London sleeping car and London and Penzance through carriages), 12.4, 3.12, 6.52, 8.39, 9.13 and 10.13 p.m., the two last mentioned with through carriages and the former also with restaurant cars from London. There are, however, no trains on the Edinburgh route *via* Bathgate, none on the West Highland line, and none on any of the suburban routes except to Helensburgh and Milngavie during

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the summer months. To the former place there are seven trains, Queen Street (L.L.) at 11.15 a.m., 12.14, 12.50, 1.50, 3.0, 4.15 and 7.15 p.m., and returns due at 1.14, 2.9, 6.44, 7.49, 8.26, 9.37 and 10.4 p.m., while to Milngavie there are fifteen trains in each direction at regular intervals from 10 a.m. to 9.30 p.m. A frequent service is also given to Balloch during the summer months, but an arrangement exists whereby this service is worked alternate years by the L.M. & S company.

It will be seen that except for a fairly well distributed express service between Edinburgh and Glasgow, no attempt is made on Sundays to provide complete train facilities, in that the Helensburgh service is primarily designed to meet the needs of excursionists. The services which are run are, however, well patronised on the basis of cheap fares, and they are supplemented by special express half-day trips (with restaurant car accommodation) to Fort William and other favourite resorts, which are now regularly run and which often involve two or even three or more trains for one advertised service.

The services outlined above are, as usual, based upon the summer timetables, but except for the inevitable reduction in Clyde steamer traffic, suspension of most of the Loch Lomond steamer services, and the withdrawal of trains primarily run to meet summer and holiday requirements, the train services are not greatly reduced during the winter months. There may be slightly fewer trains, loads may not be so great, and there may not be so many passengers about the station, but even during the winter Queen Street is a busy place, its resources are none too generous, and its train services continue to include many elements of interest.

In conclusion, the writer is indebted to various officers of the L.N.E.R. for information utilised in the preparation of this article, for facilities for exploring the station in detail and for statistical and other data, and in particular to Mr. J. Ellis, District Superintendent, Glasgow, and Mr. Jackson, stationmaster, and members of their staffs.

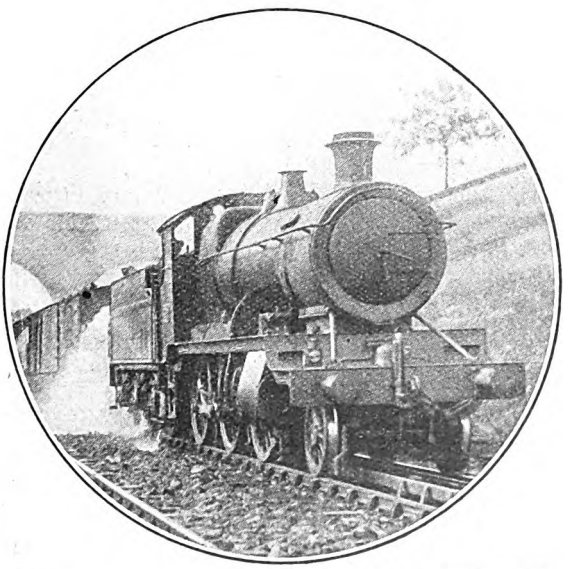

Photo.] [*H. Gordon Tidey.*

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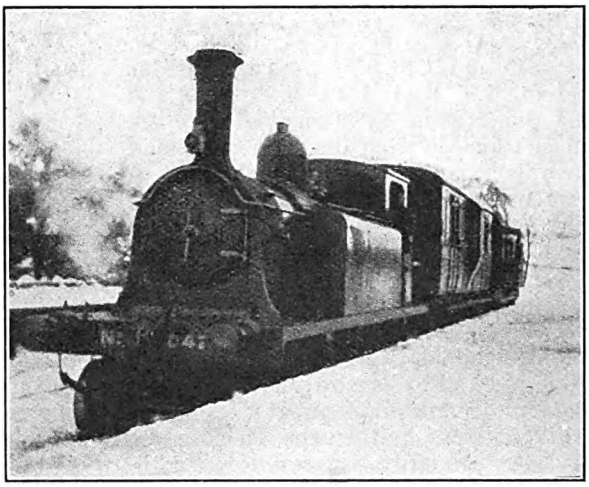
The Lauder Light Railway.

By C. HAMILTON ELLIS.



TRAIN AT OXTON STATION.
L.N.E.R. 4-4-0T No. 10427.

THE Lauder Light Railway, otherwise known as the "Auld La'der Licht," consists of 10¼ miles of single track connecting the hill-town of Lauder, in Berwickshire, with Fountainhall, where it makes junction with the main "Waverley Route" of the London and North-Eastern Railway. It was incorporated in 1898 as a private company, two years after the passing of the Light Railways Act, and was opened for traffic on July 2, 1901, trains being worked from the first by the North British Railway Company. The concern passed into the hands of the London and North-Eastern Railway Company as from January 1, 1922, under the Railways Act of 1921.

Leaving a terminal bay on the down side of Fountainhall Station, the train, consisting of a small tank-engine and two six-wheel passenger vehicles, after proceeding for a short distance parallel to the main line, turns sharply to the left and curves up the hill in a north-easterly direction. Barely two hundred yards are covered before the line crosses the Edinburgh-Galashiels Road on the level, and at this point the train halts while the guard opens the crossing gates. The train having crawled gingerly through, the gates are shut behind it, and having picked up the guard it restarts.

After six and a half miles of picturesque curvature through the hills, the solitary intermediate station of Oxton is reached, where passengers and gossip are exchanged and the engine pauses for breath.

Then, continuing up the long gradient, the train veers round to the south, and after an easing off and then a falling of the gradient, runs into Lauder terminus, which consists of an unpretentious wood and galvanised-iron structure, a small goods yard and a wooden shed for one locomotive.

The smart little engine employed by the L.N.E.R. for working the branch is of the 4-4-0T type, coupled wheels, 5 ft. diameter; bogie-wheels (solid centres), 2 ft. 6 in. diameter; heating surface 700 square feet; tank capacity 655 gallons; weight in working order 36 tons 10 cwt. This type was introduced by the late Mr. D. Drummond on the old North British Railway in 1880.

The passenger stock is very comfortable in both classes, fitted with steam heating and incandescent gaslight.

The normal train service consists of three trains in each direction on weekdays, with two extras on Saturdays.

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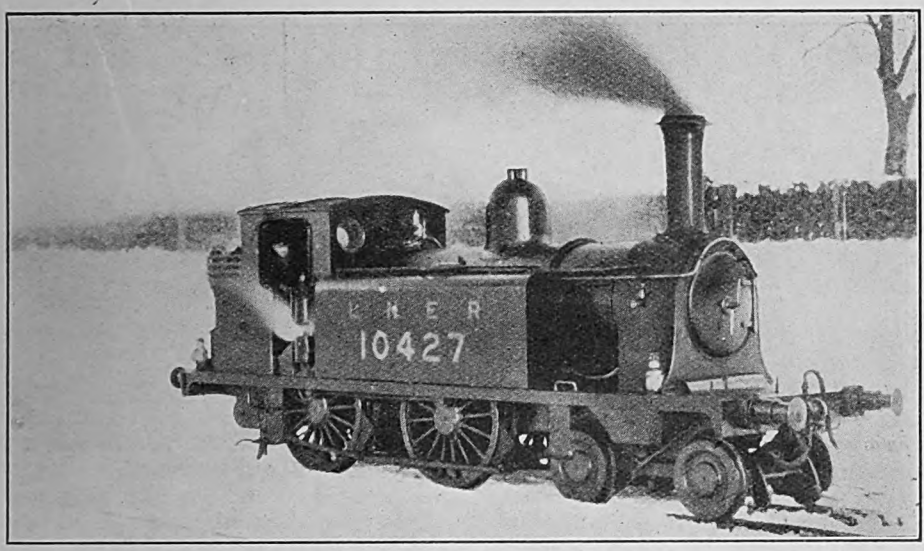

0-4-4T No. 10427 USED ON LAUDER LIGHT RAILWAY.

There is no Sunday service. Apart from Oxton Station there is one siding close to Fountainhall, which connects with a quarry and crushing plant.

The signalling arrangements are of the standard London and North Eastern pattern, and traffic is operated on the train-tablet system.

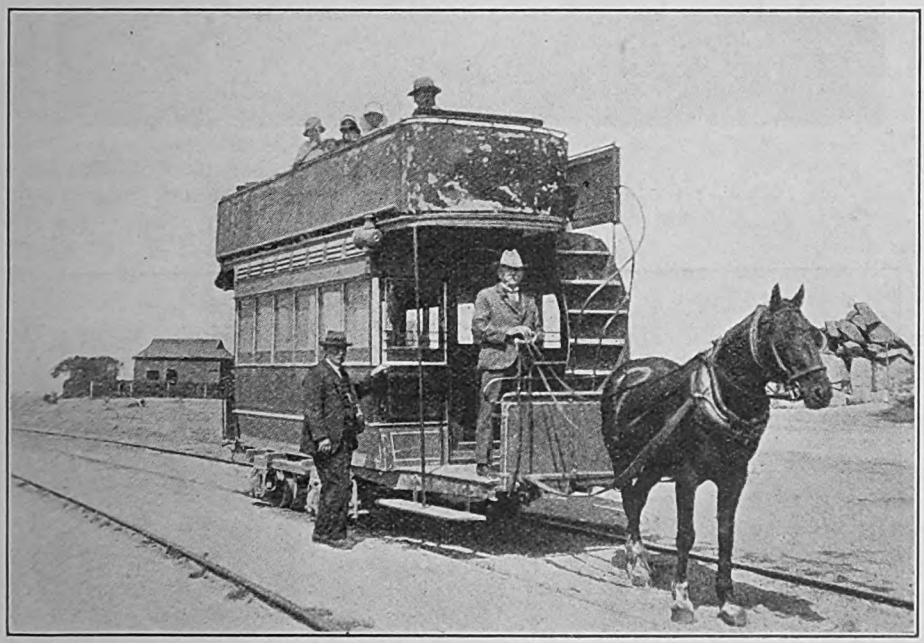

Photo.] [*J. R. Goggs.*

PORT VICTOR-GRANITE ISLAND BRANCH LINE, SOUTH AUSTRALIAN GOVERNMENT RAILWAYS.

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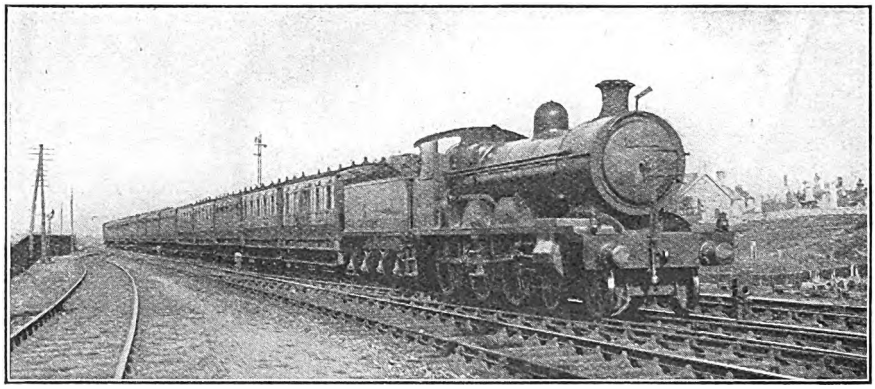

Photo.] [*C. J. L. Romanes.*

G.S.W. No. 14669 ON GLASGOW-AYR EXPRESS NEAR PRESTWICK.

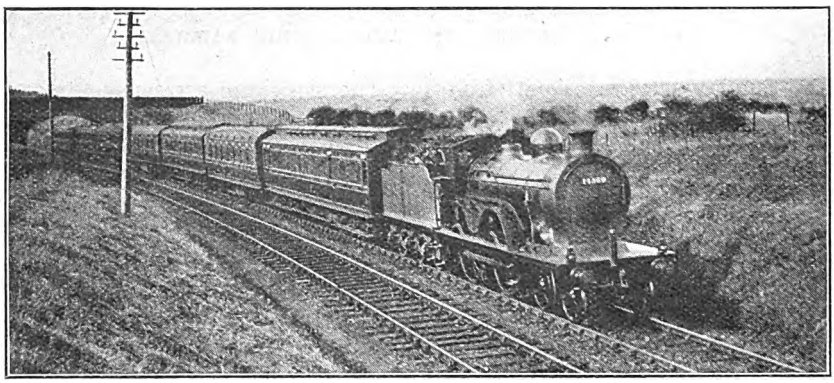

Photo.] [*C. J. L. Romane*

G.S.W. 4-4-0 No. 14369 ON GLASGOW-STRANRAER TRAIN.

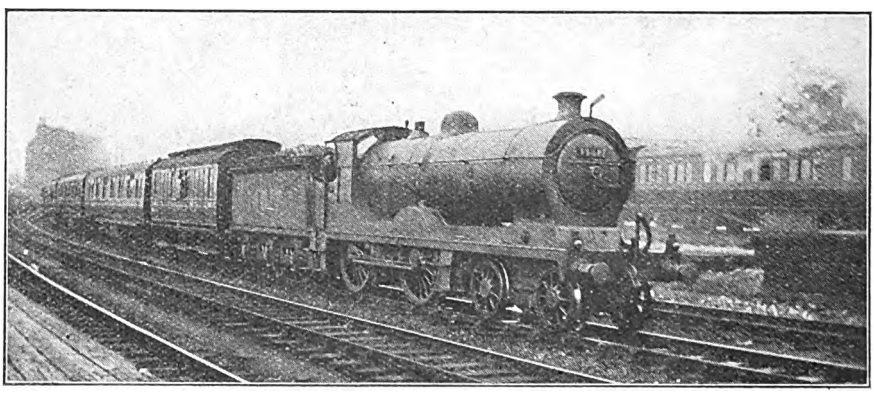

Photo.] [*J. B. Aird.*

G.S.W. 4-4-0 No. 14547 ON RELIEF IRISH BOAT TRAIN.

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The Scottish Locomotives of the L.M.S.R.

By "INDICATOR."

ALTHOUGH the principal pre-grouping locomotives now included in the L.M.S.R. stock have been superseded to a certain extent on the heaviest main line duties, both pasenger and goods, by the "Royal Scot" 4-6-0's, the Midland type compound 4-4-0's, the ubiquitous Midland type superheater goods and, more recently, the 2-6-0 mixed-traffics, Caledonian, Glasgow and South Western, and Highland engines are still, necessarily, doing a great deal of the ordinary every-day work of the L.M.S.R. in Scotland, and in view of the many inquiries as to renumbering and other matters, and the considerable interest which attaches to so many of the engines themselves, it is proposed to review in this article, as concisely as possible, the various classes of engines concerned, connecting up, incidentally, the new and old numbers. It must, however, be emphasised that no attempt can be made to give a detailed history, to follow out the various rebuilds, reboilerings, etc., which have taken place from time to time, or to consider variations within a class, as to do so would take up very much more space than can be allocated on this occasion.

We are, however, indebted to Sir Henry Fowler, K.B.E., Chief Mechanical Engineer, L.M.S.R., for kindly revising the article so as to indicate all engines withdrawn from service to date, and for sufficient revision to render it authoritative as far as called for within the limitations of scope adopted.

To avoid the constant repetition of the commencing numerals of the five-figure numbers which all the pre-grouping Scottish locomotives of the L.M.S.R. carry, L.M.S. numbers are stated in series thus—**14100-1-2-3-4——**, and the same method is adopted where the Caledonian, G. & S.W. or Highland numbers permit, though in many cases this can only be done to a limited extent owing to the fact that, frequently, the engines were numbered to fill blanks and not in sequences, and in numerous instances, owing to the system of numbering in power classes, with variations due to some engines of a class having been rebuilt, superheated or otherwise changed in class, so that the new numbers do not agree even in order with the old ones.

First, it will be of interest to give an analysis of the pre-grouping Scottish locomotive stocks as they were constituted on grouping. The respective totals were: Caledonian, 1,070; Glasgow and South Western, 528; Highland, 173; total, 1,771. These were of the following wheel types:—

	C.R.	G.S.W.R.	H.R.
0-4-2.. ..	20	55	—
2-4-0.. ..	—	3	3
0-6-0.. ..	386	177	12
4-4-0.. ..	171	181	80*
4-6-0.. ..	65	19	50
2-6-0.. ..	5	11	—
0-8-0.. ..	8	—	—
0-4-0T ..	40	10	—
0-4-2T ..	2	—	—
2-4-0T ..	—	—	1
0-6-0T ..	202	18	6
0-4-4T ..	141	20	5
4-4-0T ..	12	—	8
0-6-2T ..	—	28	—
0-6-4T ..	—	—	8
0-8-0T ..	6	—	—
4-6-2T ..	12	—	—
4-6-4T ..	—	6	—

* Including 21 duplicate engines.

A good many of these engines have, of course, since been scrapped. Indeed, that would probably have been the case independently of grouping, owing to the age of some of the engines and their old design. As there have been a few instances of renumbering and one or two cases of changed allocation, it is not proposed to give general details of the class allocation of numbers, though this information will appear incidentally, while supplementary remarks are necessary here and there to cover reclassification due to rebuilding, etc., and other causes. Except to state that a list of principal dimensions (as at the date of construction or of grouping) is given, there is no need

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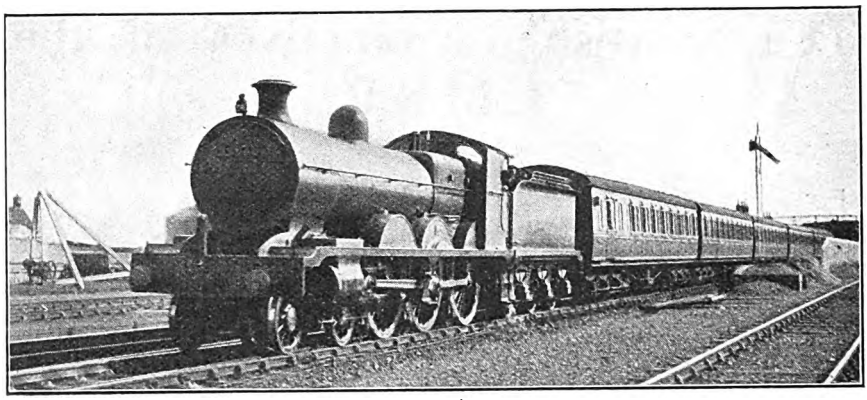
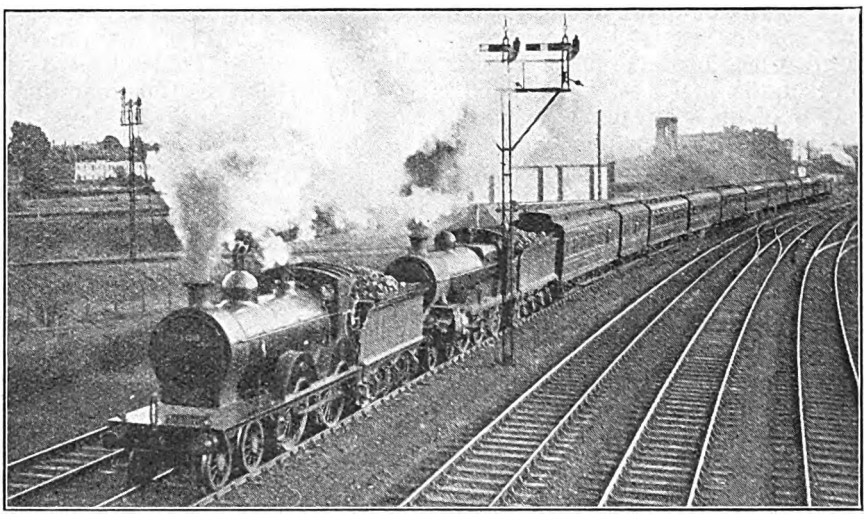
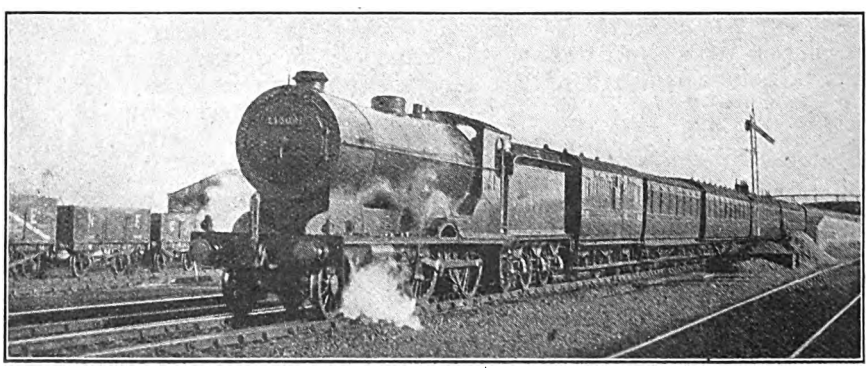


G.S.W. 4-6-0 No. 14671 ON AYR-GLASGOW TRAIN.



G.S.W. 4-4-0 No. 14259 AND 4-6-0 No. 14673.



G.S.W. 4-4-0 No. 14509 "LORD GLENARTHUR."

(*Photos by C J. L. Romanes.*)

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to delay further with the general review which this article is intended to give, beyond mentioning that the tender engines are numbered within series allocated on the basis of power classification, 1, 2, 3, 4 or 5, the last being the most powerful. Numbers of engines since scrapped are indicated by an asterisk without further explanation.

Numbers in 14000 are allocated to passenger tender engines. Nos. 14000*-1*-2* = G.S.W. Nos. 727, 720 and 723, are now blank ; these were the only 2-4-0's. No. 14010 is the once-famous Caledonian 4-2-2 No. 123, later 1123, and for a number of years used only for working the official inspection saloon. It is understood that the engine is to be repainted in its original style and sent to the York Railway Museum.

No other numbers were utilised until 14100, which commences the 4-4-0's of power classes 1 and 2. Of these a number at first power class 1 became or are now power class 2. Indeed, the following are, or were, the only engines (including those now scrapped as shown by an asterisk) in power class 1:—

Caledonian.

14101*-2*-4*-6*-7*-8* = 1180-1-3-7-8, 1080
14110*-1*-2*-5* = 1082, 1114, 1195 and 1198

Glasgow & South Western.

14116, 14122-4*-5*-7 = 700, 707-8, 710, 712
14132-4-5-8*-9 = 715-7, 705, 448-9
14140-1*-2-3-4-5-6-7-8*-9 = 450, 459, 465-6, 451-2-3-4-5-6
14150*-1*-2*-3-4*-5-6*-7*-9 = 457-8, 460-1-2-3-4, 399, 413
14161-2*-4*-5-6*-7 = 414-5, 417-8-9, 420
14172-4*-6*-7-8*-9 = 421-7, 435, 398, 400-1
14180*-1*-2*-4-7*-8-9* = 402-9, 410, 429, 403-4-5
14190*-1*-3*-4-5-6-7-8*-9 = 423-4-8, 431-2-3, 396-7, 436
14202*-3*-4-5*-6*-7*-8-9* = 439, 350-1-2-3-4-5-6
14210*-1-2 = 357-8-9
14228*-9* = 469, 470
14230*-1*-2*-3*-4-5*-6-7*-8*-9 = 471-2-3-4-5-6-7-8-9, 480
14240*-1*-2*-3*-5-9* = 481-2-3-4, 440, 441
14250*-1-3* = 442-3-5

The only remaining 4-4-0's of power class 1 are Highland. First we have Nos. 14271-2-3*-4-5-6 = 89 (*Sir George*), 92A (*Strathdearn*), 94 (*Strathay*), 95 (*Strathcarron*), 98 (*Glentruim*), and 100 (*Glen Bruar*). With these must be associated No. 14278 = 82A (formerly *Fife*). There are also Nos. 14277, 14279*, 14280*-1*-2*-3*-4-5* = 67 (formerly *Cromartie*), 86-7-8, 32-3-4 and 48, which, though numbered as passenger 4-4-0's, are now classed as for goods traffic.

It may be said that all the 4-4-0's thus far considered are of old and out-of-date classes, which explains why so many have been scrapped. Power class 2, however, also includes a number of old engines, especially Caledonian, so that we also find a fair proportion scrapped.

14100-3-5-9, 14113-4 = *Caledonian* 1179, 1182-8, 1081, 1196-7

Then comes a G. & S.W. series:—

14117-8-9 = 701-2-3
14120-1-3-6-8-9 = 704-6-9, 711-3, 467
14130-1-3-6-7 = 468, 714-6, 718-9
14158, 14160-3*-8*-9 = 412, 446, 416, 377, 406
14170-1-3-5 = 407-8, 422, 434
14183-5-6, 14192, 14200-1* = 426, 430, 447, 425, 437-8
14213-4-5-6*-7-8*-9* = 360-1-2-3-4-5-6
14220-1*-2*-3-4*-5*-6-7 = 367-8-9, 370-1-2-3-4
14244*-6-7-8 = 411, 379, 380-1
14252*-4*-5*-6-7*-8-9* = 444, 382-3-4-5-6-7
14260-1-2-3-4-5-6*-7-8-9, 14270 = 388-9, 390-1-2-3, 375-8, 395, 376, 485
14290*-1*-2*-3*-4*-5*-6*-7*-8-9* = *Caledonian* 1067-8-9, 1072-4, 1061, 1124, 1079, 1066, 1070
14300*-1*-2*-3*-4-5*-6*-7*-8*-9 = *Caledonian* 1071-3-5, 1060-2, 1083-4, 1090, 1013-5
14310 = *Caledonian* 1018

This brings us to the McIntosh régime, commencing with the famous "Dunalastair" series:—

14311-2-3-4-5-6-7-8-9 = 721 (formerly *Dunalastair*), 722, 723 (formerly *Victoria*), 724, (formerly *Jubilee*), 725-6-7-8-9
14320-1-2-3-4-5 = 730-1-2-3-4-5

These are followed by those of the "Dunalastair II" class, not transferred to power class 3 due to rebuilding, superheating, etc.:—

14326-7-8-9, 14330-1-2-3-4-5-6 = 767-8, 770, 773-4-5-6-7-8-9 (formerly *Breadalbane*), 780

The "Dunalastair III" engines not superheated are also in the same class:—

14337-8-9, 14340-1-2-3-4-5-6-7-8 = 887-8-9, 890-1-2-3, 895-6, 902, 897, 899

These are followed by the 137 and 925 series:—

14349, 14350-1-2-3-4-5-7-8-9 = 140-1-2-3-4-5-6-8-9, 150
14360-1-2-3-4-5 = 925-6-7, 137-8, 136

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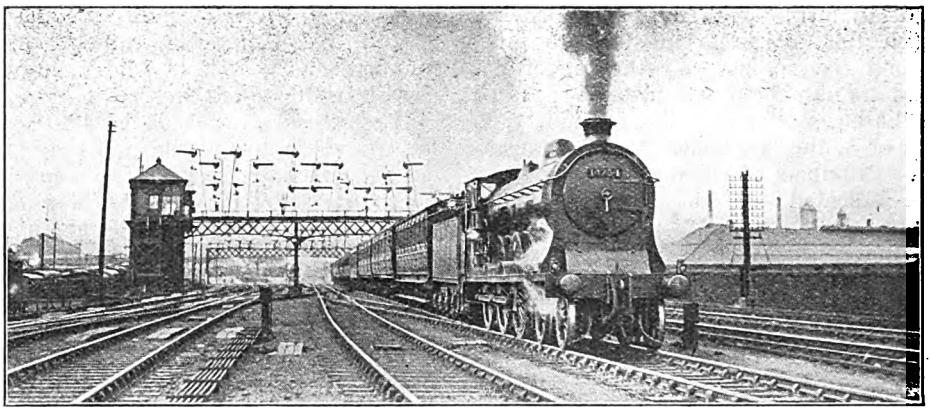

Photo.] [*H. Gordon Tidey.*

C.R. 4-6-0 No. 14754 ON LONDON EXPRESS LEAVING ABERDEEN.

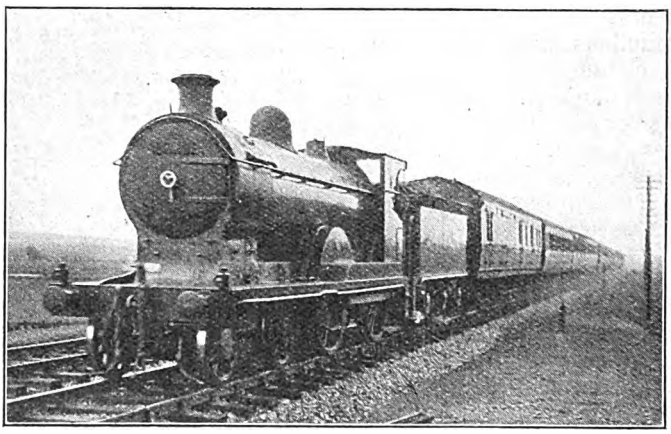

Photo.] [*P. Ransome-Wallis.*

C.R. 4-4-0 No. 14484 NEAR CARSTAIRS.

Photo.] [*H. Gordon Tidey.*

C.R. 4-4-0's Nos. 14502 AND 14803 ON PULLMAN EXPRESS FROM ABERDEEN.

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Then comes a series of G.S.W. 4-4-0's:—

14366-7*-8*-9 = 337-8-9, 340
14370*-1*-2*-3*-4-5*-6-7-8* = 341-2-3-4-6-7-8-9, 345

Next come the Highland "Lochs":—

14379 = 119 (*Loch Insh*),
14380 = 120 (*Loch Ness*),
14381 = 121 (*Loch Ericht*),
14382 = 122 (*Loch Moy*),
14383 = 123 (*Loch an dorb*),
14384 = 124 (*Loch Laggan*),
14385 = 125 (*Loch Tay*),
14386 = 126 (*Loch Tummel*),
14387 = 127 (*Loch Garry*),
14388 = 128 (*Loch Luichart*),
14389 = 129 (*Loch Maree*),
14390 = 130 (*Loch Fannich*),
14391 = 131 (*Loch Shin*),
14392 = 132 (*Loch Navar*),
14393 = 133 (*Loch Laoghal*),
14394 = 70 (*Loch Ashie*),
14395 = 71 (*Loch Garve*),
14396 = 72 (*Loch Ruthven*).

These are followed by the "Small Bens":—

14397 = 1 (*Ben-y-gloe*),
14398 = 2 (*Ben Alder*),
14399 = 3 (*Ben Wyvis*),
14400 = 4 (*Ben More*),
14401 = 5 (*Ben Vrackie*),
14402 = 6 (*Ben Armin*),
14403 = 7 (*Ben Attow*),
14404 = 8 (*Ben Clebrig*),
14405 = 9 (*Ben Rinnes*),
14406 = 10 (*Ben Slioch*),
14407 = 11 (*Ben Macdhui*),
14408 = 12 (*Ben Hope*),
14409 = 13 (*Ben Alisky*),
14410 = 14 (*Ben Dearg*),
14411 = 15 (*Ben Loyal*),
14412 = 16 (*Ben Avon*),
14413 = 17 (*Ben Alligan*),
14414 = 38 (*Ben Udlaman*),
14415 = 41 (*Ben Bhach Ard*),
14416 = 47 (*Ben a'bhuird*).

The remaining power class 2 Highland 4-4-0's are the "Large Bens":—

14417 = 61 (*Ben Na Caillich*),
14418 = 63 (*Ben Mheadhoin*),
14419 = 64 (*Ben Mholach*),
14420 = 65 (*Ben a' Chait*),
14421 = 60 (*Ben Bhreach Mhor*),
14422 = 62 (*Ben Na Chaoruinn*).

in that order.

The 4-4-0's of power class 3 commence with the "Dunalastair II" class engines which have been superheated. These are:—

14430-1-2-3 = 766 (formerly *Dunalastair II*), 769, 771-2.

These are followed by the "Dunalastair III" 4-4-0's, similarly treated:—

14434-5*-6-7-8-9 = 894, 900-1, 898, 923-4.

Then come the "Dunalastair IV's," or the 140 class, which have been superheated, including No. 139, the first trial engine with Schmidt superheater, and No. 122, the test Robinson superheater engine. Some of these engines have already appeared as power class 2, but those in power class 3, that is, superheated, are:—

14346 = 147
14440-1-2-3-4-5-6-7-8-9 = 139, 132-3-4-5, 117-8-9, 120, 122.

These are followed by the next development, the 40's, 70's, 80's and others of the same general class, as follows:—

14450-1-2-3-4-5-6-7-8-9 = 43-4-5-6-7-8. 39, 40-1-2
14460-1-2-3-4-5-6-7-8-9 = 123, 113-4-5-6, 121, 124, 928-9, 930
14470-1-2-3-4-5-6-7-8-9 = 931-2-3-4-5-6-7, 72-3-4
14480-1-2-3-4-5-6-7-8-9 = 75-6-7-8-9, 80-1-2-3-4
14490-1-2-3-4-5-6-7-8-9 = 85-6-7-8-9, 90-1, 66-7-8
14500-1-2-3-4-5-6-7-8 = 69, 70-1, 92-3-4-5-6-7

This series is completed by 13 G. & S.W. 4-4-0's consisting of No. 394, the four-cylinder *Lord Glenarthur* rebuilt by Mr. Whitelegg from Mr. Manson's original four-cylinder single 4-4-0 of 1897, then known as No. 11; the Drummond small-wheeled 4-4-0's of the 330 class; and the two extra-powerful Highland 4-4-0's *Snaigow* and *Durn*, built by Mr. Cumming for working north of Inverness before 4-6-0's were allowed there. These various engines are:—

14509 = G.S.W. 394 (*Lord Glenarthur*)
14510-1-2-3-4-5-6-7-8-9, 14520-1 = 331-2-3-4-5-6, 325-6-7-8-9, 330
14522-3 = *Highland* 73 (*Snaigow*) and 74 (*Durn*).

Dealing now with the 4-6-0's, the early Oban 4-6-0's with 5-ft. wheels, built by Mr. McIntosh, and their successors definitely introduced for goods traffic are in power class 3 as follows:—

14600-1-2*-3-4-5-6-7-8 = 55-6-7-8-9, 51-2-3-4
14609, 14610-1-2-3-4-5-6-7-8 = 908, 909 (*Sir James King*), 910, 911, (*Barochan*), 912-3-4-5-6-7.
14619, 14620-1-2-3-4-5-6 = 191-2-3-4-5-6-7-8.

Then, in power class 4, come Mr. Pickersgill's 4-6-0's, with 6-ft. wheels, of the 60 class:—

14650-1-2-3-4-5 = 60-1-2-3-4-5,

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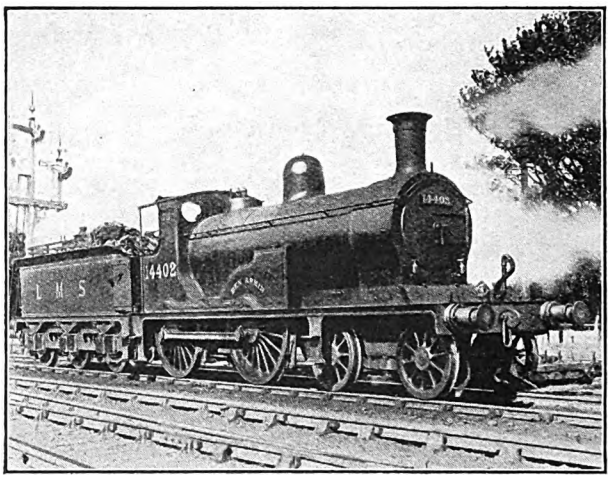
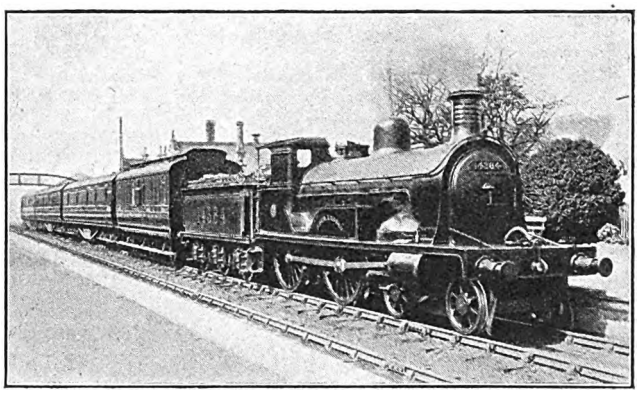
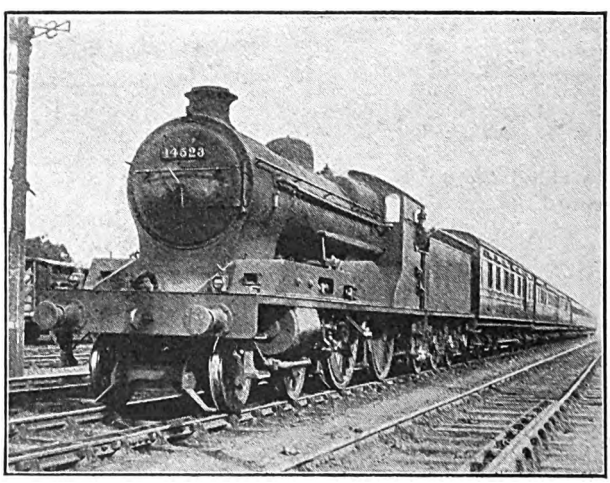


4-4-0 No. 14402
"BEN ARMIN"
(REBUILT WITH
CALEDONIAN BOILER.)



4-4-0 No. 14384
"LOCH LAGGAN"
AT PITLOCHRY.



4-4-0 No. 14523
"DURN" NEAR
INVERNESS.

(*Photos. by R. D. Stephen.*)

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4-4-0 LOCOMOTIVES.

Class.	Cylinders, Inside.	Coupled Wheels.	Steam Pressure.	Heating Surface.	Grate Area.	Weight (Engine).	Weight E. & T.
	Inches.	Ft. In.	Lb. per Sq. In.	Sq. Ft.	Sq. Ft.	Tons.	Tons.
Caledonian :—							
McIntosh 721	18½ × 26	6 6	160	1403·2	20·6	47	86 (*a*)
,, 766	19 × 26	6 6	175	1500	20·6	49	98(*a*)
,, 887	19 × 26	6 6	180	1540	22	51¾	101¼(*a*)
,, 140	19 × 26	6 6	180	1615	21	56½	112½(*a*)
,, 117	20¼ × 26	6 6	170	1660	21	59	115(*b*)
,, 122	20 × 26	6 6	170	1660	21	59	115(*b*)
Pickersgill 113	20 × 26	6 6	170	1529	21	61¼	107¾(*b*)
G.S.W. :—							
J. Manson 394 .. .. (Rebuilt R. H. Whitelegg)	14 × 26 14 × 24	6 9½	180	1803	27·6	61½	98¾(*c*)
P. Drummond 325 ..	19½ × 26	6 0	180	1922·6	27·6	62	109¼
Highland :—							
D. Jones "Loch" ..	19 × 24	6 3½	175	1295	20·5	49	87½
	19 × 24	6 3½	175	1451	20	50	88½
P. Drummond "Small Bens"	18¼ × 26	6 0	175	1175	20·3	46	83½
P. Drummond "Large Bens"	18¼ × 26	6 0	175	1149	20·3	53¾	92(*b*)
	18¼ × 26	6 0	175	—	—	—	—
C. Cumming 73 and 74 ..	20 × 26	6 3	175	1140	25·5	55	98¼

(*a*) Not superheated. (*b*) Superheated. (*c*) No. 11, rebuilt *Lord Glenarthur*.

4-6-0 LOCOMOTIVES.

Class.	Cylinders, Inside.	Coupled Wheels.	Steam Pressure.	Heating Surface.	Grate Area.	Weight (Engine).	Weight E. & T.
	Inches.	Ft. In.	Lb. per Sq. In.	Sq. Ft.	Sq. Ft.	Tons.	Tons.
Caledonian :—							
McIntosh 51	19 × 26	5 0	175	1810	20·6	57½	94¾(*a*)
,, 49	21 × 26	6 6	200	2323	26	70	125(*b*)
,, 49	20¾ × 26	6 6	175	2170	26	71½	126½(*c*)
,, 903	20 × 26	6 6	200	2260	26	73	130(*b*)
,, 903	20¾ × 26	6 6	175	2330	26	74¼	131¼(*c*)
,, 908	19 × 26	5 9	180	2023	21	64	102(*d*)
,, 918	19 × 26	5 0	175	1844	21	60½	98½(*e*)
Pickersgill 191	19½ × 26	5 6	185	1823	21·9	62¾	100¾
,, 956	18½ × 26(3)	6 1	180	2640	28	81	129
G.S.W. :—							
J. Manson 495	20 × 26	6 6	175	1852	24·6	67	117
,, 510	20 × 26	6 6	175	1861	27	68	118(*f*)
,, 495	20 × 26	6 6	175	1852	24·6	67	117
Highland :—							
P. Drummond 140.. ..	19½ × 26	5 9	175	2050	26·5	60	104½(*g*)
D. Jones 103.. ..	20 × 26	5 3	175	1672	22·6	56	94½
C. Cumming 75.. ..	20¼ × 26	5 3	175	1199	22·75	56½	92
,, 49.. ..	21 × 26	6 0	175	1467	25·5	62½	104¼(*h*)

(*a*) Original Oban Line 4-6-0's. (*b*) As originally built. (*c*) As rebuilt and superheated. (*d*) Mixed-traffic class. (*e*) Goods class. (*f*) As rebuilt by Mr. R. H. Whitelegg. (*g*) "Castle" class. (*h*) "Clan" class.

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and following these the G. & S.W. 4-6-0's (power class 3):—

14656-7*-8-9 = 495-6-7-8
14660*-1*-2-3-4-5-6-7-8*-9 = 499, 500-1-2-3-4-5-6-7-8
14670-1-2-3-4 = 509, 511, 510, 512-3.

This series is completed by the Highland "Castle" engines (power class 3):

14675 = 140 (*Taymouth Castle*),
14676 = 141 (*Ballindalloch Castle*),
14677 = 142 (*Dunrobin Castle*),
14678 = 143 (*Gordon Castle*),
14679 = 144 (*Blair Castle*),
14680 = 145 (*Murthly Castle*),
14681 = 146 (*Skibo Castle*),
14682 = 147 (*Beaufort Castle*),
14683 = 148 (*Cawdor Castle*),
14684 = 149 (*Duncraig Castle*),
14685 = 30 (*Dunvegan Castle*),
14686 = 35 (*Urquhart Castle*),
14687 = 26 (*Brahan Castle*),
14688 = 27 (*Thurso Castle*),
14689 = 28 (*Cluny Castle*),
14690 = 29 (*Dalcross Castle*),
14691 = 50 (*Brodie Castle*),
14692 = 58 (*Darnaway Castle*),
14693 = 59 (*Foulis Castle*).

In power class 4 we find also the two original Caledonian engines, 4-6-0's Nos. 49 and 50, and Nos. 903-906 (No. 907 was scrapped after the Quintinshill accident of 1915):—

14750-1 = 49, 50 (*Sir James Thompson*)
14752-3*-4*-5* = 903 (*Cardean*), 904-5-6,

followed by the Hawthorn Leslie 4-6-0's built for the Highland but transferred to the Caledonian, though they are now in use on the section for which they were originally intended. These are:—

14756-7-8-9, 14760-1 = 938-9, 940-1-2-3.

The series is completed by Mr. Cumming's "Clan" class 4-6-0's for the Highland Railway:—

14762 = 49 (*Clan Campbell*),
14763 = 51 (*Clan Fraser*),
14764 = 52 (*Clan Munro*),
14765 = 53 (*Clan Stewart*),
14766 = 54 (*Clan Chattan*),
14767 = 55 (*Clan Mackinnon*),
14768 = 56 (*Clan Mackenzie*),
14769 = 57 (*Clan Cameron*).

Finally, we have Mr. Pickersgill's three-cylinder 4-6-0's for the Caledonian, the only passenger 4-6-0's classed as 5:—

14800-1-2-3 = 956-7-8-9.

(*To be continued.*)

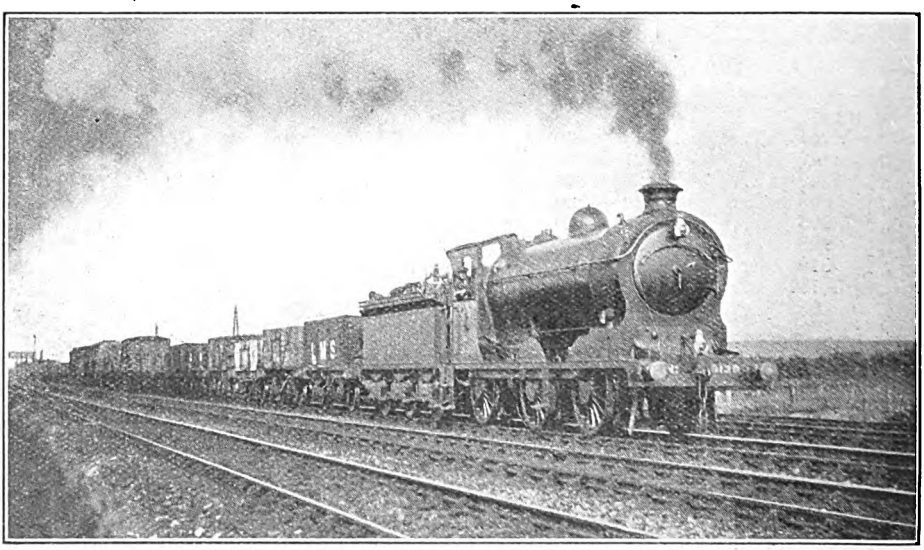

Photo.] [*C. J. L. Romanes.*

L.N.E.R. (LARGE N.B.) 0-6-0 No. 9139 ON GOODS TRAIN AT DREM.

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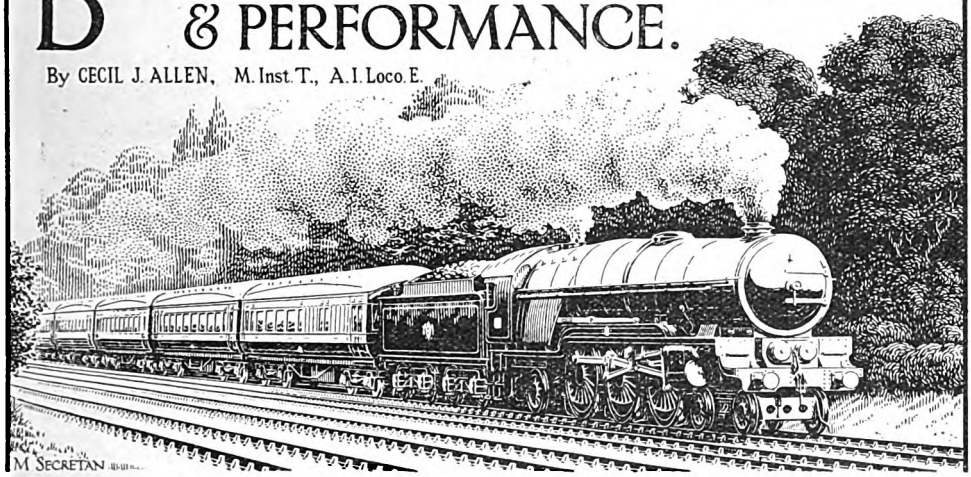
BRITISH LOCOMOTIVE PRACTICE & PERFORMANCE.

By CECIL J. ALLEN, M.Inst.T., A.I.Loco.E.



ONCE again I am indebted to various correspondents for a selection of Scottish runs, which, added to such experiences as I have had myself, enable me to give a fairly comprehensive survey, as is customary in January, of express locomotive performance North of the Border. I have little doubt that the particular journeys which will arouse the most widespread interest are those made over the mountainous stretches of the London and North Eastern "Waverley" route, between Carlisle and Edinburgh, by the Gresley "Pacifics." Preliminary experiments showed that the high-pressure "Pacifics" might reasonably be entrusted with trains of 400 tare tons weight over the twin summits of Whitrope and Falahill, and during the past summer this rated ability has been triumphantly vindicated in all weathers. What this means in the reduction of operating costs is best expressed by the fact that the North British "Atlantics" were not permitted to haul more than 290 tare tons over the same course; the "Pacifics" are, therefore, entrusted with a tonnage higher by nearly 40 per cent. than the powerful 4-4-2 locomotives previously employed.

It has further to be remembered that the ascents from Hardengreen Junction to Falahill, and from mile-post 73 (Newcastleton) to Whitrope, are both harder than the neighbouring Beattock Bank of the London Midland and Scottish, as the total length of 9½ miles, on each of London and North Eastern banks, is inclined almost exclusively at 1 in 70, whereas the average of the lower 4 miles of Beattock is 1 in 84, and of the upper 6 miles about 1 in 75. It is but rarely now that the "Royal Scots" take above 400 tons unassisted up Beattock, and stops for banking engines are not infrequent with less than this figure. Incidentally, the appearance of the London and North Eastern Railway "Pacifics" at Carlisle has provided the first opportunity for the premier express locomotive rivals of the London and North Eastern and London Midland and Scottish Companies to meet—metaphorically rather than literally, I hasten to add!—on the same metals.

Three runs from Edinburgh to Carlisle, each one "Pacific"-hauled, appear in the first table. The task was the easiest on the first run, with the 10.5 a.m., as the gross load of 355 tons to Galashiels was reduced to 285 tons between there and Hawick, whence to Carlisle the total was 310 tons. After climbing the 1 in 80 from Portobello to Niddrie North Junction, *Flamingo* attained 45½ m.p.h. on the 175-250 to Hardengreen Junction. From there the

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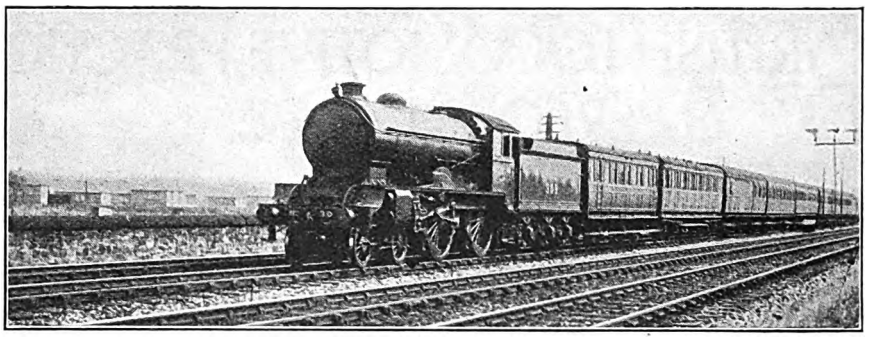

Photo.] L.N.E.R. 4-4-0 No. 309 "BANFFSHIRE." [*C. J. L. Romanes.*

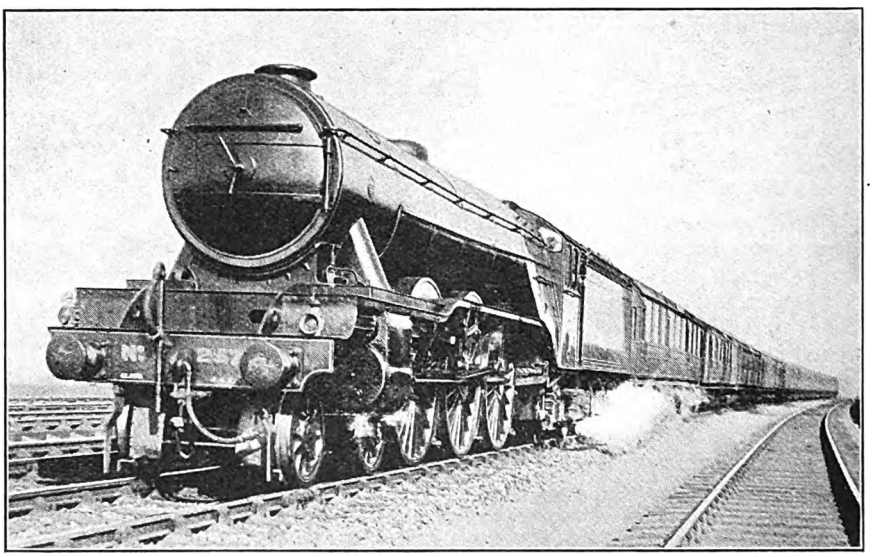

Photo.] [*R. D. Stephen.*

EAST COAST EXPRESS NEAR CRAIGENTINNY, 4-6-2 No. 2575 "GALOPIN."

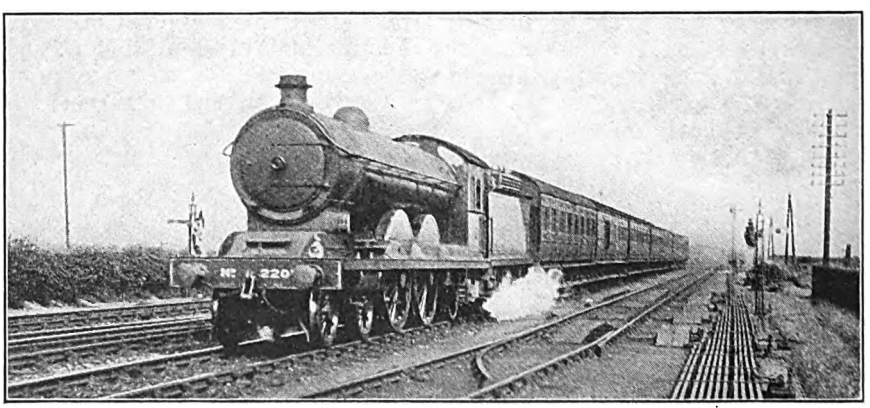

Photo.] L.N.E.R. 4-4-2 No. 2201 NEAR DREM. [*C. J. L. Romanes.*

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speeds were 26 m.p.h. minimum on the 1 in 70 to beyond Gorebridge, 34 attained up the short 111 to Fushiebridge, 24 minimum on the 1 in 70 to above Tynehead, and 29 attained on the final mile at 1 in 100 to Falahill, which was passed just over a minute early. Speed was not allowed to exceed 57½ m.p.h. on the winding descent to Galashiels, where the gain of a minute had been maintained. The short runs to Melrose and St. Boswell's were made inside time, but ½-min. was lost to Hawick, owing to a minimum of 41 m.p.h. at Standhill and a very leisurely descent beyond. Ample amends were made, however, on the final stretch to Carlisle. Banked just out of the platform at Hawick, No. 2749 attained 33 m.p.h. on the mile at 112-123 shortly after starting, fell to 25 an hour up the 1 in 80 past Stobs, attained 33 on the easier 2 miles to Shankend, dropped to 26½ at the top of the 1 in 75, on entering the tunnel, and breasted the final 1 in 96 to Whitrope Summit at 30 m.p.h. Again the falling grades were taken at less than the customary "Atlantic" speed, but the ½-min. gain to Whitrope

L.N.E.R. EDINBURGH TO CARLISLE.—WORKING OF "PACIFIC" LOCOMOTIVES.

Distance.	Engine, Super 4-6-2 No. / " Name / Load to Galashiels / " Hawick to Carlisle	Schedule.	2749 *Flamingo.* 338/355T 294/310T	2745 *Captain Cuttle.* 330/350T 363/395T	Schedule.	2745 *Captain Cuttle.* 353/385T 353/385T
Miles.		min.	min. sec.	min. sec.	min.	min. sec.
0·0	EDINBURGH (WAVERLEY)	0	0 00	0 00	0	0 00
3·0	Portobello	6	4 50	5 03	6	5 00
4·5	*Niddrie South Junction*	8	7 00	7 00	8	6 55
8·2	*Hardengreen Junction*	13	12 10	12 10	13	12 00
9·7	Newtongrange	—	14 00	13 55	—	13 45
12·0	Gorebridge	—	18 35	18 10	—	17 40
14·4	*Borthwick Bank*	—	—	—	—	22 30
16·0	Tynehead	—	27 30	27 23	—	26 15
17·9	*Falahill Summit*	33	31 55	31 54	33	31 00
19·1	Heriot	—	33 45	33 26	—	33 00
22·6	Fountainhall	—	37 25	37 37	—	37 05
26·7	Stow	—	41 45	41 46	—	41 45
29·8	Bowland	—	45 05	45 17	—	45 30
				sigs.		
33·5	GALASHIELS	51	49 50	51 22	51	51 00
3·7	MELROSE	6	5 30	6 00	6	6 00
3·4	ST. BOSWELL'S	7	6 30	6 42	—	5 50
4·6	Belses	—	8 15	7 27	—	10 50
6·1	*Standhill Siding*	—	10 25	p.w.s.	—	—
7·9	Hassendean	—	12 40	11 23	—	14 25
12·2	HAWICK	17	17 30	17 23	20	19 35
3·9	Stobs	—	9 50	10 27	—	10 40
7·0	Shankend	—	16 30	16 35	—	17 20
10·9	*Whitrope Summit*	25	24 30	23 47	25	26 00
13·1	RICCARTON JUNCTION	28	27 10	26 51	28	29 05
16·6	Steele Road	—	31 25	31 14	—	33 15
21·2	NEWCASTLETON	37	36 10	36 06	37	38 15
24·3	Kershope Foot	—	39 30	39 03	—	41 25
28·8	Penton	—	44 10	43 43	—	46 10
31·3	Riddings Junction	—	46 55	46 22	—	49 15
33·5	Scotch Dyke	—	49 20	48 38	—	51 30
35·8	LONGTOWN JUNCTION	53	51 50	50 55	53	53 40
				p.w.s.		
38·8	Lyneside	—	54 10	53 57	—	56 40
41·0	Harker	—	56 45	—	—	58 50
						sigs.
43·9	*Canal Junction*	62	60 15	—	62	64 00
45·4	CARLISLE (CITADEL)	66	64 10	64 27	66	68 00

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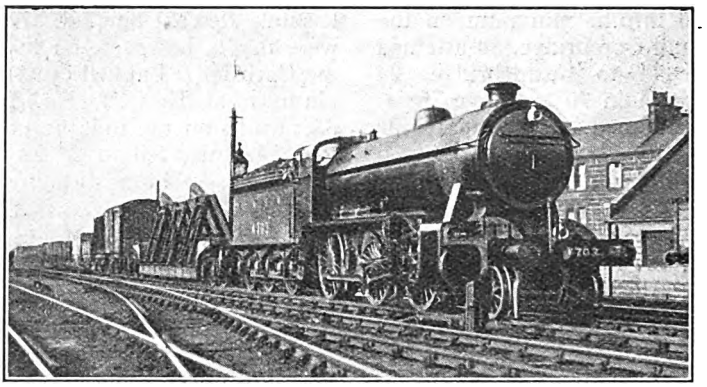

Photo.] [*P. Ransome Wallis.*

L.N.E.R. GOODS TRAIN NEAR GORGIE, EDINBURGH. G.N. 2-6-0 No. 4703.

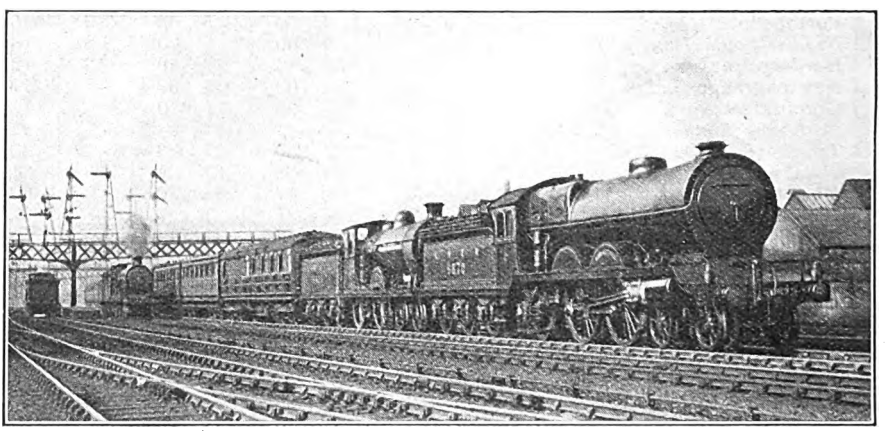

Photo.] [*H, Gordon Tidey.*

5.45 P.M. EAST COAST EXPRESS LEAVING ABERDEEN. 4-4-0 No. 9570, "BON ACCORD," AND 4-4-0 No. 9420, "THE ABBOT."

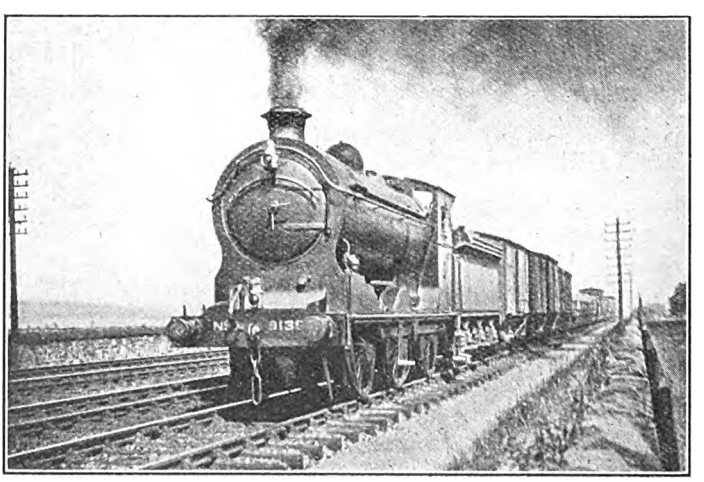

Photo.] [*C. J. L. Romanes.*

GOODS TRAIN NEAR DREM. 0-6-0 No. 9134.

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had expanded to nearly 2 min. on arrival at Carlisle.

The next run, timed by a well-known correspondent, was one in which the 10.5 a.m. out of Edinburgh carried a tare load of 330 tons from Edinburgh through to St. Boswell's (the Kelso portion being run independently), where the tare was increased to 363 tons. To Galashiels the similarity between this and the preceding run is striking, the times to Falahill tieing to within a single second, and witnessing once again to the extraordinarily consistent running achieved by North British drivers over these most difficult grades—a consistency, indeed, for which I have found no exact parallel anywhere else in the country. *Captain Cuttle* was slightly faster from Hardengreen Junction to Newtongrange, but fell to 24 m.p.h. at Gorebridge, and passed Falahill at 27 an hour. The net time to Galashiels was 50 min. Hawick should have been reached from St. Boswell's in 16¼ min., allowing for the Hassendean check. In view of the load from Hawick—the heaviest in the table—the climbing to Whitrope was extremely fine, the engine gaining 1¼ min. here. On the 1 in 80 above Stobs the minimum rate was 25½ m.p.h., followed by a gain to 36 at Shankend and a minimum of 30 on entering Whitrope Tunnel. An average of, roughly, a mile-a-minute was maintained from Newcastleton to Longtown, after which came a bad relaying check. Despite a slow approach to Carlisle, however—the final 1.7 miles taking 3 min. 50 sec.—the run from Hawick was completed in 1½ min. under schedule, and the net time was 63¼ min.

The third run was made on the night express leaving Edinburgh at 9.55 p.m., and its particular interest lies in the fact that the recorder—Mr. R. A. H. Weight—was privileged to travel on the footplate of *Captain Cuttle*. The heavy train consisted throughout of one 12-wheeled "sleeper," and nine 8-wheelers, two 6-wheelers and five 4-wheelers, totalling fifteen vehicles or 58 axles. A fine September night added zest to the trip, and a singular record was established by the fact that driver and fireman—J. Kettle and T. Kettle—are father and son. It was too dark for mile-posts to be seen, so that exact minimum speeds are not available, but they have been deduced with fair accuracy from the passing times.

Starting away in 40 per cent. cut-off from Edinburgh, with full regulator, Driver Kettle soon reduced to 30 per cent. and ¾-open for the easy initial section, and, in addition, reduced speed slightly at Portobello and Eskbank. At Millerhill cut-off was advanced to 35 per cent. and regulator to full open. Speed touched or slightly exceeded 50 m.p.h. at Millerhill, before the Eskbank slack. There was no change of working until Tynehead, where the fact of being ahead of time induced the driver to link up to 30 per cent. Up to that point speed had ranged from 33 down to about 27 m.p.h., but the average up the final stage from Tynehead to Falahill was 25 m.p.h. Pressure remained constant at 210 lb. per sq. in.—just within "blowing-off" point—and at 175 lb. or so in the steam-chest. The effect of this excellent running was a gain of 2 min. to the summit, after which some abnormally restrained downhill running brought the train into Galashiels dead on time. Little need be said of the short runs between Galashiels and Hawick, except as to the smart time of 19 min. 35 sec. for the 15.6 miles from Melrose to Hawick, start-to-stop, achieved—all but the start—on 15 to 20 per cent. cut-off and a full to ¾-regulator.

The start from Hawick, which is at 1 in 75-72 for ¾-mile from the platform-end, was made on 65 per cent. cut-off, with the usual rear-end assistance just to get the train on the move; after that Kettle came back to 32 per cent., but found it necessary to increase to 35 per cent. by Stobs; full regulator was used throughout to Whitrope. Pressure was maintained at 200 to 205 lb. throughout the climb. In this case, however, the time fell short of that achieved on *Captain Cuttle's* previous trip, with the same load, by 2¼ min. up to Whitrope, and a minute was, in fact, dropped. The driver made no immediate attempt to regain this downhill—where coasting, with frequent brake applications, was, of course, the order of the going—but apart from a bad signal check approaching Canal Junction, he would have passed that point just on time. From 20 to 25 per cent. cut-off and ¾ to full regula-

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tor, according to the road, was employed over most of the easy length from Newcastleton to Carlisle. It is extremely interesting to hear that the average coal consumption of the high-pressure "Pacifics" over this route is no greater than that of the "Atlantics" which they replaced, despite the fact of working trainloads which are, on the average, heavier by 100 tons per train.

Between Edinburgh and Glasgow my runs have been confined to a couple, one in each direction, which are both devoid of any exceptional features. Westbound, "Shire" class 3-cylinder 4-4-0 No. 2757, *Dumfries-shire,* had to handle a very heavy load of 385 tons (371 tons tare, 50 axles) on the 9 p.m. train, allowed 65 min. with a Polmont stop. We passed Haymarket, 1.2 miles, in 3 min. 35 sec.; Saughton Junction, 3.5 miles, in 6 min. 55 sec.; Ratho, 8.2 miles, in 12½ min.; Winchburgh Junction, 12.6 miles, in 17 min. 40 sec.; Linlithgow, 17.6 miles, in 22 min. 50 sec.; and Manuel, 19.8 miles, in 24 min. 55 sec.—7.8 miles to this point in 7 min. 50 sec.—reaching Polmont, 22.3 miles, in 27 min. 50 sec. After standing 1½ min. here, we got through Falkirk, 3.2 miles, in 6½ min., and Bonnybridge, 6.5 miles, in 10 min. 20 sec., ran the 12.2 miles thence to Lenzie in 12 min. 40 sec., passed Cowlairs, 23.4 miles, in 29 min. 20 sec., and after the usual crawl down Cowlairs bank, reached Glasgow in 34 min. 5 sec. from Polmont and 63½ min. from Edinburgh, a gain of 1½ min. Maximum speeds were 64½ m.p.h. at Manuel and 60 at Waterside Junction.

In the opposite direction, "Director" class 4-4-0 No. 6382, *Colonel Gardiner,* had a 320-ton 11-coach train on the 8.25 p.m. out of Glasgow, which now carries a Pullman restaurant car. We mounted to Cowlairs, with the usual rear-end assistance, in 6¼ min., start-to-stop. From there we passed Lenzie, 4.7 miles, in 8 min., and Croy, 9.9 miles, in 14 min., ran the 7.0 miles on to Bonnybridge in 7¼ min., with a maximum of 61½ m.p.h., and stopped at Falkirk, 20.2 miles, in 25¼ min. from Cowlairs. The run of 3.2 miles from Falkirk to Polmont took 6 min. 20 sec., start-to-stop. From Polmont we got through Linlithgow, 4.7 miles, in 7 min., and Winchburgh Junction, 9.7 miles, in 12 min. 35 sec.; from here we ran the 4.4 miles to Ratho in 4 min. 40 sec., and the 7 miles on to Haymarket in exactly 7 min., with a maximum speed of 65 m.p.h. So Haymarket, 21.1 miles from Polmont, was passed in 24¼ min., and Waverley was reached in 27 min. precisely, a gain of a minute on schedule.

From a correspondent comes a run on the 4.0 p.m. express from Glasgow to Leeds, wherein "Shire" No. 264, *Stirlingshire,* had a 330-ton train. Cowlairs was passed in 5 min. 50 sec., Lenzie in 13 min. and Croy in 19 min. 10 sec., whence the 7 miles to Bonnybridge took 7¾ min. Falkirk, 21.8 miles, was passed in 30¼ min., Polmont, 25.0 miles (after a slight slack through Falkirk Tunnel) in 33 min. 55 sec., Linlithgow, 29.7 miles, in 38¼ min., at 64 m.p.h., and Winchburgh, 35.3 miles, in 43 min. 35 sec. The 19.9 miles from Castlecary to this point had been run in 19 min. 50 sec. A signal check now ensued, but speed recovered to 63 an hour at Saughton Junction, and Haymarket was reached in 56 min., gross time, or 55 min. net. The schedule allows 58 min.

On the East Coast route north of Edinburgh, where I tried, as usual, the southbound "Aberdonian" sleeping car express, the running was hardly up to the usual standard. A colossal train had been up, with such a veritable spate of third-class sleepers (and not "returned empties," as this, in early October, was in the direction of the flow of traffic, and the excess of accommodation on all the night trains was inexplicable) that they were being used as ordinary coaches. The total weight of the 58-axle formation was 464 tons empty, and the gross 490 tons or upwards, including passengers, luggage and fish. "Atlantic" No. 9869, *Bonnie Dundee,* piloted 4-4-0 No. 9420, *The Abbot.*

Attaining 37 m.p.h. on the mile at 1 in 344-260 after Ferryhill Junction, we fell to 29½ up the 118-154-116-102 to Cove Bay, and breasted Portlethen Summit at 37½ m.p.h. No higher speed than 61½ m.p.h. was run on the subsequent falling grades, and we fell to 44 on the sharp rise after Muchalls. Stonehaven was

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passed at 61½ m.p.h., Dunottar Box (after the 1 in 85-107 up) at 30½ an hour, and Carmont Summit, after a recovery to 36½ m.p.h. on the 1 in 423 beyond Dunottar, at 31½ m.p.h. So we passed Ferryhill, after climbing ½-mile at 1 in 96 from the start, in 2 min. 35 sec., Cove Bay in 10 min. 25 sec., Portlethen in 15 min. 55 sec., Muchalls in 19 min. 35 sec., Stonehaven in 24¾ min., Dunottar in 28 min. 50 sec., and Newmill Box, 21.4 miles, in 33 min. 50 sec. Directly after this there came a bad p.w. check, and gentle downhill running ensued, with no higher speeds than 61½ m.p.h. at Fordoun and 67 at Craigo, separated by a disappointingly low minimum of 46½ m.p.h. beyond Laurencekirk. We passed Fordoun in 41¼ min., Laurencekirk in 44 min. 50 sec., Marykirk in 48 min. 40 sec., Kinnaber Junction in 53 min. 40 sec., at reduced speed, and reached Montrose, 40.6 miles, in 58 min. 5 sec. The booking is 58 min., but includes allowance for a conditional stop at Stonehaven, which was not made. From Montrose we accelerated from the start up 1 in 88 to 29 m.p.h. at Usan and 31 at the summit—a good effort with 490 tons. Lunan Bay, 4.9 miles, was cleared in 10 min. 50 sec., and the 13.7 miles to Arbroath were completed in 21 min. 50 sec., almost exactly as booked. The level stretch from Arbroath to Dundee was, as always, the *venue* of the poorest running, speed never rising above 58½ m.p.h., so that for the 17 miles from Arbroath we took 23 min. 20 sec., or 20 sec. overtime.

At Dundee "Atlantic" No: 9875, *Midlothian,* and G.N. 4-4-0 No. 3063 replaced the two previous engines, but beyond a good start to Leuchars Junction, 8.3 miles (rising for the first 2 miles at 1 in 66-114), in 13 min. 35 sec., they did not do too well. From 64½ m.p.h. at Leuchars we fell to 45½ up 1¾ miles at 1 in 160 to Dairsie, and 1½ miles further at the same inclination to Springfield brought us down to 37½ m.p.h. On the 1 in 95-111 of Falkland Road bank we fell further to 26 m.p.h. So we took 15 min. 10 sec. from Leuchars to Ladybank, 11.8 miles, 7 min. 35 sec. from Ladybank up to Lochmuir, 4.2 miles, 5 min. 40 sec. for the 4.2 miles on to Thornton Junction, 4¾ min. from Thornton (where we slacked to 20 m.p.h.) up to Dysart, 2.7 miles, and 9¼ min. for the 7.9 miles thence down to Burntisland. Kirkcaldy, 33.3 miles, was passed in 48 min. 55 sec., at 64½ m.p.h., but we slowed to 35 an hour at Kinghorn and to 20 through Burntisland, the 39.1 miles to the latter place needing 56 min. Thence the 6.9 miles over Dalgetty Summit to Inverkeithing occupied 11 min. 20 sec., and after slowing severely over the junctions, we mounted the 2 miles at 1 in 70 up on to the Forth Bridge at a minimum rate of 23 m.p.h., passed Dalmeny, 49.7 miles, in 74 min. 25 sec., Haymarket, 58.0 miles, in 83 min. 55 sec., and reached Waverley, 59.2 miles, in 87 min. 55 sec., having dropped 4 min. on schedule.

Among various runs which I have received from correspondents, two North British "Atlantic" starts out of Stonehaven are worthy of comment. No. 9869, *Bonnie Dundee,* with 315 tons, attained 28½ m.p.h. up the ascent to Dunottar, largely 1 in 92, accelerated to 35½ on the short 423 above, and breasted Carmont Summit, at 1 in 102, at 31½ m.p.h. No. 9902, *Highland Chief,* piloted by Holmes' 4-4-0 No. 9769, produced the remarkable speeds of 31, 42 and 37 m.p.h. respectively at these points, with a gross load of no less than 470 tons. Times on the two runs were 6 min. 55 sec. and 5 min. 40 sec. to Dunottar Box, 2.6 miles, 11¾ and 10 min. to Carmont, 5.5 miles, 14 min. 10 sec. and 12 min. 10 sec. to Drumlithie, 7.2 miles, 7 min. 25 sec. and 8 min. 5 sec. (including a signal check in the latter case) over the 7.3 miles on to Laurencekirk, 8¼ and 8 min. for the 7.4 miles thence to Kinnaber, and 3 min. 55 and 45 sec. for the final 2.6 miles of single line into Montrose, making 33 min. 45 sec. and 32 min. respectively for the 24.5 miles from Stonehaven over Carmont Summit to Montrose. Maximum speeds were 65 and 68 m.p.h. at Fordoun, and 69 on both runs at Craigo, with intervening minima of 47½ and 49 m.p.h. beyond Laurencekirk.

We now pass to the London Midland and Scottish system, and I will begin with the description of some journeys between Perth and Aberdeen. It is over this length of line that Scotland, in my judgment, shows the nearest approach that it has to the operating conditions of the Great Central main line of the

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L.N.E.R. south of Nottingham—trains of moderate weight, many intermediate stops, and exceptionally fast start-to-stop timings in the case of practically every train. The first of the four runs tabulated was one made by myself on the 1.30 p.m. out of Glasgow, carrying its winter load. At the top of the 1 in 175 at Luncarty we were doing 43½ m.p.h., but the 2 miles at 1 in 125 to Stanley Junction brought us down to 40½ an hour. Down the dip from Ballathie to the Tay we touched 67 m.p.h., breasting the opposite rise at a minimum of 60; and on the gentle descent from Woodside we again reached 67 m.p.h.

Between Alyth Junction and Forfar, where we ran 12.0 miles start-to-stop in the very smart time of 14¼ min., we attained 66 m.p.h. on the level. The maximum between Forfar and Guthrie was 61 m.p.h., and after falling to 45 on the sharp rise past Glasterlaw, we reached 70½ on crossing the South Esk Valley, before Bridge of Dun. Up till now we had been doing little more, on balance, than keep bare time, but time was lost on the next stage, to Laurencekirk, owing to a signal check which all but stopped us at Marykirk. The rest of the run calls for little remark. Cutting time at stops, we left Stonehaven

L.M.S. (CALEDONIAN SECTION).—PERTH–ABERDEEN.

Distance.	Engine: 4-4-0 No. .. .. / Load, tons, tare .. .. / ,, ,, full	Schedule.	*14490 196 205	Schedule.	†14448 300 320	Distance.	Schedule.	‡1067 198 210	Schedule.	‡1143 244 260
Miles.		m.	m. s.	m.	m. s.	Miles.	m.	m. s.	m.	m. s.
0·0	PERTH	0	0 00	0	0 00	32·5	36	36 00	20	22 05
1·6	*Almond Junction*	4	4 00	4	3 50	30·9	33	—	16	sigs.
4·2	Luncarty	—	7 40	—	7 30	28·3	—	30 20	—	p.w.s.
7·2	Stanley Junction	11	12 00	11	11 55	25·3	25	27 15	10	11 05
11·3	Cargill	—	16 25	—	16 35	21·2	—	23 00	—	6 55
13·6	Burrelton	—	18 45	—	19 05	18·9	—	20 37	—	4 15
15·8	COUPAR ANGUS	21	21 10	22	21 55	16·7	16	18 25	18	18 10
2·5	Ardler	—	4 20	—	4 35	14·2	—	16 05	—	15 30
4·7	ALYTH JUNCTION ..	7	7 10	6	7 08	12·0	12	13 50	13	13 25
8·8	Eassie	—	6 00	—	11 18	7·9	—	9 45	—	9 40
11·0	Glamis..	—	8 10	—	13 25	5·7	—	7 40	—	7 40
16·0	*Forfar S. Junction*	14	13 10	18	18 25	0·7	—	—	—	—
16·7	FORFAR	15	14 15	19	19 30	57·3	73	70 00	24	22 30
2·4	Clocksbriggs	—	4 25	4	4 50	54·9	—	66 45	—	19 20
5·0	Auldbar Road	—	7 15	—	7 40	52·3	—	63 55	—	16 35
7·0	GUTHRIE	9	9 25	9	9 40	50·3	65	61 32	15	14 20
9·0	Glasterlaw	—	3 50	—	11 40	48·3	—	59 10	—	12 00
12·3	Farnell Road	—	7 20	—	14 55	45·0	—	—	—	7 20
15·4	BRIDGE OF DUN ..	11	10 45	19	18 40	41·9	55	51 15	4	4 00
2·7	DUBTON	5	5 00	5	5 10	39·2	52	48 30	11	11 05
3·9	*Kinnaber Junction*	7	6 50	7	—	38·0	50	—	—	9 25
6·0	Craigo	—	sigs.	—	9 52	35·9	—	44 50	—	7 15
8·1	Marykirk	—	13 10	—	12 20	33·8	—	42 40	—	5 20
11·3	LAURENCEKIRK	17	20 40	18	17 30	30·6	41	39 22	20	19 45
3·3	FORDOUN	6	5 30	6	6 00	27·3	—	35 30	—	16 15
4·0	Drumlithie	—	7 25	—	7 40	23·3	—	31 25	—	12 40
5·7	Carmont	—	9 45	—	10 00	21·6	—	29 10	—	10 30
8·6	*Dunottar*	—	—	—	p.w.s.	18·7	—	—	—	6 10
11·2	STONEHAVEN	16	15 40	16	17 05	16·1	23	21 02	0	0 00
4·5	Muchalls	—	8 00	—	8 10	11·6	—	16 37	—	—
7·9	Portlethen	—	11 40	—	12 05	8·2	—	13 25	—	—
11·3	Cove Bay	—	15 10	—	16 05	4·8	—	8 55	—	—
15·5	*Ferryhill Junction*	19	19 40	19	21 15	—	2	—	—	—
16·1	ABERDEEN	22	21 05	22	22 55	0·0	0	0 00	—	—

* Pickersgill 4-4-0. † McIntosh superheated 4-4-0. ‡ Midland compound.

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punctually, and despite no higher speed than 67 m.p.h. in descending to Ferryhill, reached Aberdeen a minute early. On my correspondent's run with the morning train (10 a.m. out of Buchanan Street), which appears in the next column, the McIntosh superheater 4-4-0 employed had a train heavier by more than 50 per cent., but made some closely comparable running. Note should be taken, in particular, of the times of 19½ min. for the 16.7 miles from Coupar Angus to Forfar, and 18 min. 40 sec. for the 15.4 miles from Forfar to Bridge of Dun.

The first of the two up runs was made on the "Postal," which conveys a passenger portion as far as Perth. The start out of Aberdeen was brilliant, and one wishes that details of maximum and minimum speeds, which are unfortunately missing from both this and the last log, had been obtained. To climb the 21.6 miles to Carmont, even with no more than 210 tons, in 29 min. 10 sec., was an extremely fine performance. Stonehaven was cleared 2 min. ahead of time. After that, most restrained downhill running followed to Bridge of Dun, with an average rate well below 60 m.p.h.; the time from Carmont to this point could easily have been cut by 3 minutes, though the schedule was being closely observed. The rest of the run to Forfar was of the same character, and the whole run could probably have been completed in 66, instead of 70, minutes. Three minutes had, however, been gained on schedule time. Moderate travelling from Forfar to Perth sufficed to complete the famous 32.5-miles' racing course in exactly the allotted 36 minutes, the 22.6 miles from Glamis to Luncarty being run in 22 min. 40 sec. ; the remarkably optimistic booking of 16 min. for the 16.7 miles to passing Coupar Angus was not kept by a margin of 2½ min.

Componnd No. 1143 had a considerably harder task in the next run with 260 tons ; and the more so as on this train --the 6.45 a.m. out of Aberdeen—the engine works right through over the 240 miles to Carlisle. Up the steep early stage of the ascent from Stonehaven the engine attained 30 m.p.h., increased to 40 on the easy section above Dunottar ; the minimum at Carmont Summit was 36. Time was just kept to Laurencekirk with a maximum of 72½ an hour at Fordoun. Then came a brisk run to Dubton, the start-to-stop time for 8.6 miles being 11 min. 5 sec., with a top speed of 71½ m.p.h. at Craigo. From Dubton No. 1143 attained 60 m.p.h. at Bridge of Dun, mounted the 3½ miles of Farnell Road bank (mostly at 1 in 96-107) at a minimum of 37½ m.p.h., and again touched 60 before the Forfar stop, in this case gaining 1½ min. on schedule. The extraordinary timing of 18 min. for the 16.7 miles from Forfar to Coupar Angus, start-to-stop—which has so often figured as the fastest booked run on the Caledonian section—was maintained, but for a trifling loss of 10 sec., by a brilliantly smart start, and a sustained subsequent speed of 65 to 67 m.p.h. on the level. On the last lap into Perth permanent way and signal checks were jointly responsible for a loss of 2 min. on schedule. Again it should be noted that, apart from the gain on time between Dubton and Forfar, this fine running was no more than adequate to keep the extremely tight booked time.

We come now to the runs south of Perth, where the 4-4-0 locomotive also appears to reign supreme ; the conditions change, however, from moderate loading and tight times to loads which, in view of the grades to be surmounted, are often of enormous size, even allowing for easier schedules, in proportion to the power of the engines employed. From Stirling, for example, compound No. 1143, whose work has just been recorded, had to go forward on the Carlisle run with no less than 395 tons of train to Stirling. A game start was made, as the tabulated times reveal, but the tremendous climb from Dunning to Gleneagles, beginning with 3 miles at 1 in 121, steepening to 3 miles at 1 in 100, and finally to 1 in 91 before the stop, proved a little more than Midland compound ability *plus* Scottish driving skill could cope with successfully. Speed reached 53½ m.p.h. at Forteviot, and then dropped, at mileposts successively from Dunning (passed at 49½ m.p.h.), to 42½, 36, 30½ (here the 1 in 100 begins), 25½, 22 and 19½ m.p.h. respectively. With such a load it was creditable to lose more than 3 min. The start from Gleneagles has to be made for ½-mile at 1 in 101, but after that

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the difficulties are over, and No. 1143, but for a small loss of 40 sec., succeeded in keeping time to Stirling. McIntosh 4-4-0, No. 14473, with 280 tons, had a considerably easier task, and kept time without difficulty. A faster start was made to Hilton Junction, whence the times kept level to Dunning, but the simple gained 2 min. on the compound up to Gleneagles. A minute was gained from Gleneagles to Stirling, and dead time kept from there to Larbert. With the reduced load of 200 tons only, No. 14473 did some good work up to Cumbernauld, the climb from Camelon Junction including 5 miles at 1 in 98-128, and gained just over 2 min. on the easy timing from Larbert to Glasgow.

Little need be said about the three down runs tabulated. The best of them was that of the Pickersgill superheater, No. 14494, taking the 10 a.m. out of Glasgow on its winter schedule. The 2¾ miles from the start at Buchanan Street, inclined for 1¼ miles at 1 in 79, 1 at 98 and ½ at 125, provide a tough start for northbound trains, and No. 14494, with 260 tons, did more creditably than the McIntosh engine with 275 tons, clearing Robroyston in 12 min. 20 sec., as against 13¼ min. Similarly, up Dunblane bank (5.7 miles long, of which 2½ are at 1 in 78-88 and 2 more at 1 in 100), the Pickersgill machine's 5 min. for the 2.7 miles from Dunblane to Kinbuck, from a standing start at Stirling, beat the time of the McIntosh locomotive, which was 20 sec. more.

L.M.S. (CALEDONIAN SECTION).—PERTH–STIRLING–GLASGOW.

Distance.	Engine 4-4-0 No. .. Load, tons tare .. ,, ,, full ..	Schedule.	14473P 261* 280*	1143C 371 395	Distance.	Schedule.	14494P 245‡ 260‡	Schedule.	14448M 255 275	Schedule.	14496P 336† 355†
Miles.		min.	m. s.	m. s.	Miles.	min.	m. s.	min.	m. s.	min.	m. s.
0·0	PERTH	0	0 00	0 00	15·8	20	7 20	—	—	19	§19 20
2·0	*Hilton Junction* ..	4	—	5 50	13·8	15	3 47	—	—	16	16 55
3·9	Forgandenny ..	—	7 25	8 10	11·9	—	14 50	—	—	—	14 50
							sigs.				
6·8	Forteviot	—	10 40	11 30	9·0	—	11 00	—	—	—	11 50
9·6	Dunning	—	13 55	14 45	6·2	—	8 15	—	—	—	8 20
							p.w.s.				p.w.s.
13·7	Auchterarder ..	—	20 55	22 20	2·1	—	3 30	—	—	—	3 25
15·8	GLENEAGLES ..	25	25 05	27 55	17·2	26	26 25	69	67 05	27	29 45
2·2	Blackford	4	5 25	6 45	15·0	23	23 05	66	63 50	24	26 05
6·4	Greenloaning ..	—	9 45	11 10	10·8	—	18 05	—	58 50	—	21 10
							p.w.s.				
9·6	Kinbuck	—	12 50	14 15	7·6	—	13 20	—	54 45	—	16 25
12·3	Dunblane	15	15 25	16 45	4·9	8	8 20	51	49 25	9	10 00
14·3	Bridge of Allan ..	—	17 40	19 00	2·9	—	—	—	—	—	5 45
17·2	STIRLING ..	22	21 05	22 40	30·2	43	42 30	43	42 35	12	13 00
2·4	Bannockburn ..	—	4 40	—	27·8	—	39 30	—	40 00	—	9 50
4·1	Plean	—	7 20	—	26·1	—	37 20	—	37 45	—	7 20
8·1	LARBERT	12	12 00	—	22·1	33	32 25	33	32 35	33	34 20
3·6	Lower Greenhill ..	6	6 25	—	18·5	28	28 10	28	28 00	28	29 40
9·0	Cumbernauld ..	—	13 30	—	13·1	20	22 00	20	21 45	20	23 15
13·1	Glenboig	19	18 00	—	9·0	16	17 00	16	16 50	16	17 45
			p.w.s.				p.w.s.				p.w.s.
16·1	Garnkirk	22	22 30	—	6·0	—	12 20	—	13 15	—	13 10
18·7	Robroyston ..	—	25 25	—	3·4	—	8 40	—	9 45	—	9 30
21 1	St. Rollox	28	28 25	—	1·0	—	2 45	—	3 55	—	5 05
											¶
22·1	BUCHANAN ST. ..	33	30 50	—	0·0	0	0 00	0	0 00	0	0 00

* 186/200 tons Larbert-Buchanan St. ‡ 210/220 tons Stirling-Perth.
† 301/315 tons Stirling-Perth. § Perth ticket platform, 15·5 miles from Gleneagles.
C: Midland compound. P: Pickersgill type. M: McIntosh type.
¶ Stopped ¼-mile out of Buchanan St. for assistance in rear to Robroyston; restarted 1 min. 55 sec. from Buchanan St. start.

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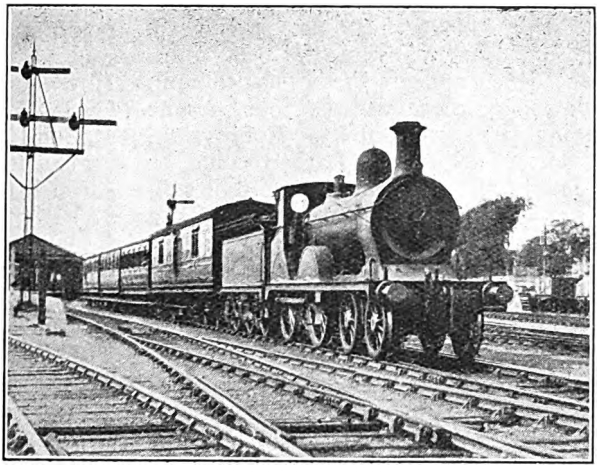
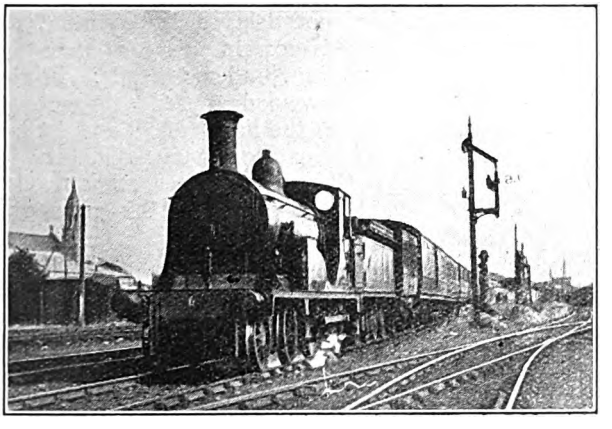
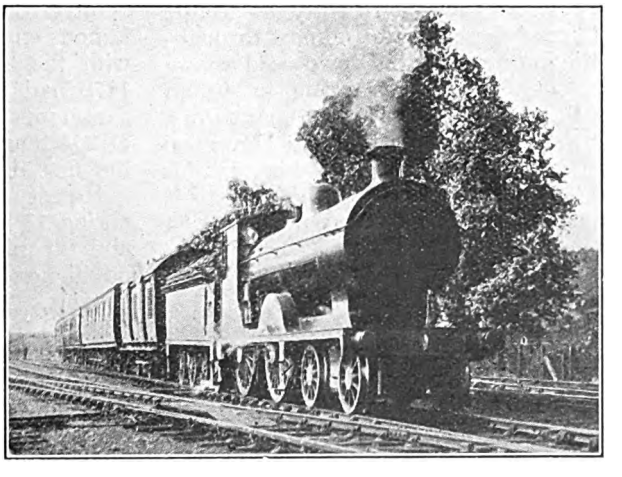


ABERDEEN STOPPING TRAIN LEAVING ELGIN. L.N.E.R., 4-4-0 No. 6822.



INVERNESS STOPPING TRAIN LEAVING DINGWELL. L.M.S.R. 4-4-0 No. 14411 "BEN LOYAL."



TAIN STOPPING TRAIN LEAVING DINGWALL. REBUILT L.M.S.R. 4-4-0 No. 14418 "BEN MHEADHOIN."

Photographs by R. D. Stephen..

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But No. 14496, of the Pickersgill type, on my run with the 1.30 p.m. down, which appears in the last column, made a poor show with 355 tons, despite banking assistance up to Robroyston. The loss of 80 sec. to Larbert could be set against the p.w. check—a pitfall subsidence—at Gartcosh, but there was a loss of a minute from Larbert to Stirling, with a minimum of 35 m.p.h. at Plean, and then, after the load had been reduced to 315 tons, we lost 2¾ min. more up to Gleneagles, speed up Dunblane bank dropping to 23 m.p.h. As a result of smart station work, however, with a quick uncoupling of the Dundee portion at Perth ticket platform, we were only 1½ min. late at Perth, and, apart from the Dunning p.w.r. check, we should probably have arrived to time. It may be added that desperate caution is displayed on the long down grades between Glasgow and Perth, and appears to be contemplated in the timings. On this last journey, for example, we descended much of the bank from Cumbernauld to Greenhill at 45 to 50 miles an hour!

Last of all some Glasgow and South Western section notes, for which, as usual, I am indebted almost exclusively to Mr. David L. Smith, of Ayr. In the table of runs between Glasgow and Ayr the first was an interesting experience behind 4-4-0 No. 595, of the Midland "Class 2" type, which with 280 tons proved herself more than equal to the 50-minute booking. Moreover, as if to falsify what I wrote recently as to the working of these engines, almost throughout the journey Driver Brown used a very short cut-off. After slacking to 40 an hour through Paisley, No. 595 maintained 52 m.p.h. up the slight rise to Howwood—the gradients appear elsewhere in this issue—and then, crossing the "sixty" line at Dalry, ran at between 60 and 64 m.p.h. thence to Barassie, when the engine was eased. Ayr was reached 1¼ min. early. The running of the big 4-6-4 tank No. 15401 in the second column on the 12.30 p.m. express (as timed by another correspondent) was a fine piece of work, 2½ min. loss by signals before Paisley being more than regained between there and Ayr. The start-to-stop time over the 33.7 miles between these points was, in fact, 37 min. 48 sec. Speed was 51 m.p.h. up the rising grades to Howwood, and again passed the "60" level at Dalry and reached 64 an hour at Bogside, but the effort was continued nearly to Ayr, 19.7 miles from Glengarnock to Newton being run in 19 min. 37 sec. Details of this run reached me, I may add, from Canada! Compound No. 1179, in the third column, did well from Paisley to Prestwick, notwithstanding signal checks; maximum speed was 64 m.p.h. at Barassie, and the 30.6 miles between these stations were covered in 37¼ min., or 34½ min. net. Finally, on the up morning 50-min. express from Ayr Driver Duncan, with 4-6-4 tank No. 15405 and 250 tons, reeled off the 27.6 miles from the start to Howwood in 30 min. 40 sec., but then, being before time, got delayed by signals; net time into Glasgow in this case was 46¼ min., or 3¾ min. under schedule. From Troon to Howwood speed throughout was between the limits of 58 and 62 m.p.h.

The extraordinary difficulty of the Ayr-Girvan Stranraer section, also profiled this month in the gradient series, requires no emphasis. Here again the compounds are now at work, and a characteristic return journey between Girvan and Stranraer, in which the presiding genius at the regulator was Driver S. Mitchell, of Corkerhill—on whom appears to have fallen the mantle of the redoubtable Fred Hough, now promoted Night Foreman at Corkerhill shed—was another remarkable example of the work Scottish drivers are getting out of these famous engines. On the southbound run, with the 3.55 p.m. from Glasgow, No. 1179 had the exceptional load—for long continuous gradients as steep as 1 in 54—of 204 tons tare and 220 tons gross. Up the first dreadful ascent from Girvan to mile-post 4 the engine slipped badly, taking 15 min. 55 sec. for the 3.7 miles, and 17¾ min. to Pinmore, 4.9 miles; with no higher rate than 60 an hour on the descent, Pinwherry was reached in 22 min., or 4 min. over schedule. Then followed a magnificent climb of the formidable Barrhill bank. Up the lower part of the ascent, at 1 in 67-75, the engine attained 30 m.p.h., passing Barrhill, 4.1 miles from the fresh start, in 9 min. 35 sec. On the 2¼ miles at 1 in

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57 following, No. 1179 actually maintained 31 m.p.h.—an amazing feat. Thus the 15½ mile-post, 7.1 miles from Pinwherry start, was passed in 15 min. 25 sec., and the summit at mile-post 16½, 8.1 miles, in 17 min. 5 sec. At favourable points on the succeeding descent some good speeds were run, such as 72½ m.p.h. before Glenwhilly, 64 before and 68 after New Luce, but all curves, and especially the station loops, were taken with great caution. The 4.5 miles from 16½ to Glenwhilly occupied 5½ min.; the 4.4 miles thence to New Luce 5 min. 10 sec.; and the 5.5 miles on to Challoch Junction 5 min. 40 sec. So the 23.7 miles from Pinwherry to Dunragit, including the terrific 8-mile ascent to mile-post 16½ and three very severe and two slight slacks, were run in 34 min. 35 sec., as against 38 min. allowed, the initial loss to Pinwherry being practically regained.

Returning on the 9.27 p.m. boat express from Stranraer Harbour, with the same train but a slightly heavier complement, making 220 tons in all, Driver Mitchell did further fine work. Stranraer Junction, 1.1 miles, was passed in 2¾ min., Castle Kennedy, 3.3 miles, in 7 min. 5 sec., Dunragit, 6.1 miles, in 10 min. 55 sec., and Challoch Junction, 7.3 miles, in 13 min., with severe slacks for the passing loop at each place. New Luce, 12.8 miles, was then cleared in 21½ min., after which came the 3 miles at 1 in 57 to mile-post 21¾, on which the minimum rate was 24½ m.p.h. This post, 16.4 miles from Stranraer Harbour, was breasted in 28¾ min., and Glenwhilly, 17.2 miles, in 30 min. 10 sec., beyond which the 3½ ascending miles, mostly at 1 in 100, to mile-post 16½ (21.7 miles, 37 min. 40 sec.) were surmounted at a minimum of 36 m.p.h. No higher speeds than 64 and 66 m.p.h. were run on the falling grades, with frequent slacks where necessary, and, of course, bad slacks at Barrhill (25.7 miles, 42 min. 50 sec.) and Pinwherry (29.8 miles, 48 min.); the climb to Pinmore was then achieved with a lowest speed of 26 m.p.h. on the 1 in 65 and a recovery

L.M.S. (G. & S.W. SECTION).—GLASGOW-AYR.

Distance.	Engine No. / Type / Load, axles / tons tare / tons full	Schedule.	595 4-4-0* 38 256 280	Schedule.	15401 4-6-4T 49 320 345	1179 4-4-0C 37 252 275	Distance.	15405 4-6-4T 34 231 250	Schedule.
Miles.		min.	m. s.	min.	m. s.	m. s.	Miles.	m. s	min.
0·0	GLASGOW	0	0 00	0	0 00	0 00	41·4	50 45	50
1·6	Shields Road	4	4 15	4	4 29	4 10	39·8	47 10	46
								sigs.	
4·2	Cardonald	7	7 50	7	8 14	7 30	37·2	43 15	43
					sigs.				
7·7	PAISLEY	11	12 05	12	14 37	12 00	33·7	39 05	39
9·7	Elderslie	13	14 35	3	4 18	4 15	31·7	36 30	37
								sigs.	
13·8	Howwood	—	19 20	—	9 04	9 15	27·6	30 40	—
16·5	Lochside	—	22 25	—	12 07	12 20	24·9	27 50	—
20·6	Glengarnock	—	26 45	—	16 26	16 45	20·8	23 45	—
						sigs.			
23·3	Dalry	28	29 30	19	19 10	19 50	18·1	20 55	23
26·8	KILWINNING	32	33 00	23	22 37	24 30	14·6	17 15	18
						sigs.			
30·2	IRVINE	36	36 10	27	25 54	28 35	11·2	13 45	14
33·8	Barassie Junction	—	39 40	—	29 35	32 20	7·6	10 10	—
34·9	Troon Goods Station	41	40 50	32	30 42	33 30	6·5	9 00	9
37·4	Monkton	—	43 35	—	33 06	35 55	4·0	6 18	—
38·3	Prestwick	—	44 35	—	34 06	37 15	3·1	5 15	5
40·3	Newton-on-Ayr	—	46 45	—	36 03	—	1·1	2 45	—
41·4	AYR	50	48 45	41	37 48	—	0·0	0 00	0

* Midland "Class 2" type. C: Midland compound type. T: Tank type.

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to 32 on the 1 in 80-92 to the summit. Pinmore, 33.0 miles, was passed in 54¾ min., mile-post 4 (summit), 34.2 miles, in 56¾ min., and with a gentle descent Mitchell reached Girvan, 37.9 miles, in 62 min. 25 sec. This was a gain of 9½ min. on the booking of 72 min., but the latter includes allowance for conditional stops intermediately, which were not made. So the late start of 20 min. from Stranraer Harbour was, by this fine driving, nearly halved on arrival at Girvan.

Such feats as these are by no means uncommon in this corner of Scotland. The same engine and driver, with 150 tare tons, has made the run from Stranraer Harbour to Girvan in 61 min. (11 min. under schedule), Girvan to Ayr with an additional stop at Maybole in the booked time of 30 min., and Ayr to Glasgow with no less than four conditional stops—Prestwick, Troon, Kilwinning and Johnstone—and the regular Paisley stop, in 60 minutes ; on another occasion, with 217 tare tons, they ran from Stranraer Harbour to Girvan in 60 min., Girvan to Ayr in 29 min., and Ayr to Glasgow in 61 min. with conditional halts at Prestwick and Irvine and 5 min. standing at Paisley in place of the allotted one minute. Yet again, on the 4.10 p.m. out of St. Enoch, Mitchell has kept time with 353 tare tons to Ayr, 259 tons on to Girvan, and 220 tons thence to Stranraer. Another fine achievement was that of Driver McKnight, of Girvan, in working a tare load of 223 tons from Stranraer Harbour to Girvan, Dunragit stop included, in 66 min., as booked, this time with one of the big Drummond 4-4-0 superheater engines. For myself, my regret is that this corner of the country is so comparatively inaccessible, as its locomotive "form" is clearly worth watching!

Acknowledgment is due, in conclusion, to the following gentlemen for correspondence received during the past month: Messrs. T. Adkins, E. O. Tuckey, J. B. Aird, E. V. Fox, F. A. Hudson, R. D. N. Oldrey, J. L. Spencer-Smith, Rev. W. H. Dew and "Cross-Country." Some of their letters contained logs of running on Scottish metals which arrived too late for inclusion in the present article. Certain other letters—particularly those of the first- and last-mentioned correspondents—contained discussions of considerable length in regard to the ideal timetable, a subject which strictly is outside the province of these articles, though the Editor kindly permits me to make reference to it from time to time. But I doubt if it will be possible to enter into the matters raised by these correspondents in the detail which they desire.

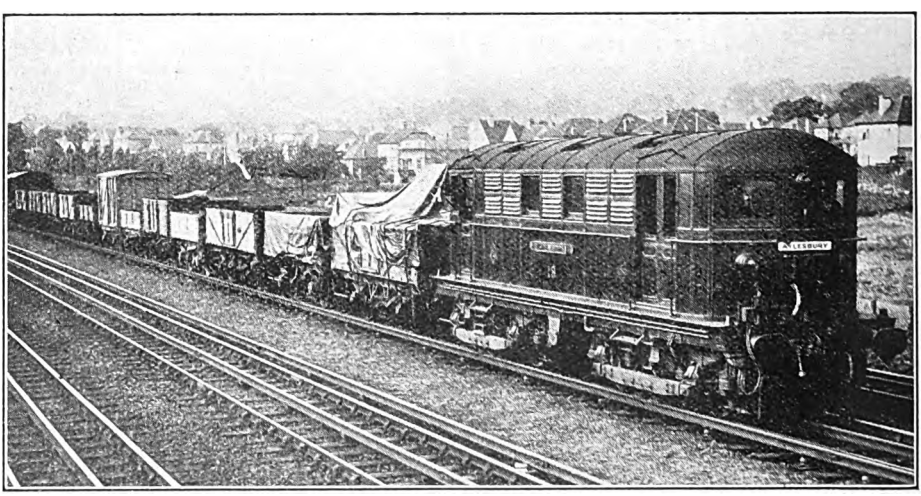

Photo.] [*Topical.*

ELECTRIC LOCOMOTIVE ON GOODS TRAIN, METROPOLITAN RAILWAY.

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Modern Locomotive Practice on the Great Western Railway.

(SUPPLEMENTARY NOTES, II.)

By F. W. BREWER, A.I.Loco.E.

I NOW append a list of the once celebrated, and formerly very numerous, 0-6-0 tender engines of Mr. Joseph Armstrong's design. Since 1904, in which year they began to be withdrawn, the majority of these engines have been scrapped. At the actual moment of writing, in fact, only seventeen remain uncondemned, out of an original total of 342. In this total were comprised twelve 0-6-0's of 1866, which immediately preceded the first of the "standard" series; the latter, in all, consisted of 310 examples, built 1866-1876; and there were, in addition, twenty coal engines, constructed in 1874. The goods engines proper had wheels of the nominal diameter of 5 ft.; the coal engines, 4-ft. 6-in. wheels. In later years, when the wheels were fitted with new tyres, the respective diameters were 5 ft. 2 in., and 4 ft. 7½ in. All of the 342 engines were built at Swindon, and all had 17-in. by 24-in. cylinders, and (originally) 140-lb. pressure.

As regards the lettered references, the engines marked (*a*), which were the first 0-6-0's designed by Mr. Armstrong, had

LIST OF MR. JOSEPH ARMSTRONG'S 0-6-0 TENDER ENGINES.
(In the order in which they were turned out.)

Nos.	Date.	Where Built.	Frames.	Cylinders.	Wheels, with new tyres.	Boiler.
360–369 (*a*)	1866	Swindon ..	Outside ..	17 in. × 24 in.	5 ft. 2 in.	Domed.
1001 & 1015 (*a*)	1866	,, ..	,, ..	,,	,,	,,
388–397 (*b*)	1866	,, ..	,, ..	,,	,,	,,
398–412	1867	,, ..	,, ..	,,	,,	,,
419–425	1867	,, ..	,, ..	,,	,,	,,
26	1867	,, ..	,, ..	,,	,,	,,
42	1867	,, ..	,, ..	,,	,,	,,
1012–1014	1867	,, ..	,, ..	,,	,,	,,
38 (*c*)	1867	,, ..	,, ..	,,	,,	,,
238 (*c*)	1867	,, ..	,, ..	,,	,,	,,
37 (*c*)	1867	,, ..	,, ..	,,	,,	,,
41 (*c*)	1868	,, ..	,, ..	,,	,,	,,
43 (*c*)	1868	,, ..	,, ..	,,	,,	,,
44 (*c*)	1868	,, ..	,, ..	,,	,,	,,
46 (*c*)	1868	,, ..	,, ..	,,	,,	,,
50 (*c*)	1868	,, ..	,, ..	,,	,,	,,
429–438	1868	,, ..	,, ..	,,	,,	,,
445–454	1868	,, ..	,, ..	,,	,,	,,
370 & 371	1868	,, ..	,, ..	,,	,,	,,
426–428	1868	,, ..	,, ..	,,	,,	,,
491–496	1870	,, ..	,, ..	,,	,,	,,
1082	1870	,, ..	,, ..	,,	,,	,,
498–500	1870	,, ..	,, ..	,,	,,	,,
1083–1085	1870	,, ..	,, ..	,,	,,	,,
497	1870	,, ..	,, ..	,,	,,	,,
501–516	1870	,, ..	,, ..	,,	,,	,,
1086–1099	1870	,, ..	,, ..	,,	,,	,,
1100–1105	1871	,, ..	,, ..	,,	,,	,,
593–602	1871	,, ..	,, ..	,,	,,	,,

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LIST OF MR. JOSEPH ARMSTRONG'S 0-6-0 TENDER ENGINES.—*contd.*

Nos.	Date.	Where Built.	Frames.	Cylinders.	Wheels, with new tyres.	Boiler.
1106–1115	1871	Swindon ..	Outside ..	17 in. × 24 in.	5 ft. 2 in.	Domed.
603–612	1871	,, ..	,, ..	,,	,,	,,
657–670	1871	,, ..	,, ..	,,	,,	,,
671–676	1872	,, ..	,, ..	,,	,,	,,
24	1872	,, ..	,, ..	,,	,,	,,
31	1872	,, ..	,, ..	,,	,,	,,
48	1872	,, ..	,, ..	,,	,,	,,
51 & 52	1872	,, ..	,, ..	,,	,,	,,
116	1872	,, ..	,, ..	,,	,,	,,
298	1872	,, ..	,, ..	,,	,,	,,
300	1872	,, ..	,, ..	,,	,,	,,
415 & 416	1872	,, ..	,, ..	,,	,,	,,
677–716	1872	,, ..	,, ..	,,	,,	,,
776–805	1873	,, ..	,, ..	,,	,,	,,
874–876	1873	,, ..	,, ..	,,	,,	,,
877–893	1874	,, ..	,, ..	,,	,,	,,
21 & 22	1875	,, ..	,, ..	,,	,,	,,
23	1876	,, ..	,, ..	,,	,,	,,
25	1876	,, ..	,, ..	,,	,,	,,
27	1876	,, ..	,, ..	,,	,,	,,
29	1876	,, ..	,, ..	,,	,,	,,
32	1876	,, ..	,, ..	,,	,,	,,
39	1876	,, ..	,, ..	,,	,,	,,
53	1876	,, ..	,, ..	,,	,,	,,
117	1876	,, ..	,, ..	,,	,,	,,
1186–1205 (*d*)	1876	,, ..	,, ..	,,	,,	,,
1206–1215 (*e*)	1876	,, ..	,, ..	,,	,,	,,
927–946 (*f*)	1874	,, ..	,, ..	,,	4 ft. 7½ in.	,,

For references to notes see text.

a wheel base of 15 ft. 6 in., but that of the later engines was 15 ft. 8 in. Nos. 1001 and 1015 were for a short time numbered 370 and 371. It is of interest to note that No. 1015 has only just been withdrawn (1929).

(*b*) Nos. 388-397 commenced Mr. Armstrong's "standard" class; wheel base, 15 ft. 8 in. (7 ft. 4 in. plus 8 ft. 4 in.).

(*c*) Down to 1870, Nos. 38, 238, 37, 41, 43, 44, 46 and 50 were, in the same order, numbered 1088-1095.

(*d*) Nos. 1196-1205 were converted to broad-gauge engines in 1886-89.

(*e*) Nos. 1206-1215 had been previously adapted to that gauge, in 1880-81. When the 7-ft. gauge was abolished, all twenty engines were altered to the standard gauge.

(*f*) These were termed coal engines. The majority of them were stationed at Birkenhead, the others at Pontypool Road, from which depôt they worked coal trains to the North. The last representative of this smaller-wheeled class, No. 934, was broken up in 1928.

Some of the Armstrong 0-6-0's (including the "360" class) were re-boilered at Swindon, and others at Wolverhampton, during Mr. Dean's time and subsequently. The modern boilers fitted from 1901 have been of the Belpaire type, and in many instances have been equipped with superheaters. The steam pressure of the "360" class was raised to 150 lb., and that of the "383" or standard series, and also that of the coal engines, to 165 lb.

As stated, the latter have now all been cut up. Of Mr. Armstrong's 5 ft. 2 in. goods engines, the following have been condemned during the past eight months: Nos. 400, 422, 877, 1015, 1092, 1187 and 1193. Those not scrapped at the time of penning these notes are: Nos. 22, 363,* 436,* 509,* 510, 512, 601,* 689,* 705,

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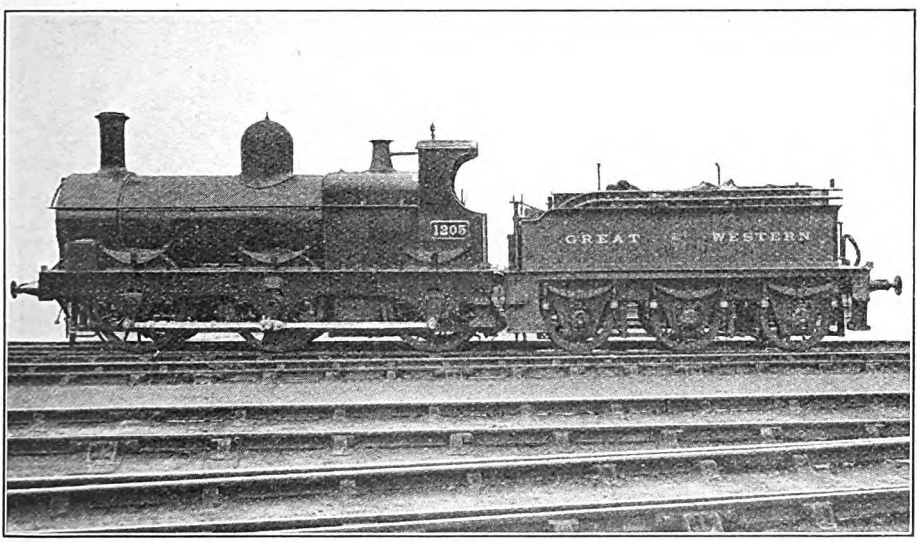
709, 1012, 1087, 1089,* 1094,* 1095,* 1195 and 1214. Those with an asterisk against them are superheated.

In parentheses, it is of special interest to note that the very first standard-gauge locomotives that were constructed at Swindon (and before that gauge had reached there) were also of the double-framed 5 ft. 0-6-0 type, and were turned out in 1855-56. The engines in question, Nos. 57-68, were briefly referred to by me when dealing with the old 0-6-0 tanks. They were of Gooch's design, and had the Gooch link motion, 15½ in. by 22 in. cylinders, domeless boilers, and outside "broad gauge" slotted frames. All of these twelve engines were subsequently broken up, and their numbers were taken by new engines, which, however, while having similar frames, had Stephenson valve-gear, cabs, and domed boilers. These renewals were completed in 1873-1875, with the exception of No. 57, which engine had been rebuilt at Wolverhampton with 16 in. by 24 in. cylinders in 1870, and which was not entirely renewed until 1890. Two, Nos. 60 and 67, were reconstructed as saddle tanks with 18 in. by 24 in. cylinders in 1876-77, but were altered to tender engines again in 1886-87. The cylinders of the new "57-68" class were mostly 17 in. by 24 in., but if my information be correct, the converted tank engines retained their 18 in. by 24 in. ones when they once more became tender engines. The diameter of the six-coupled wheels was in due course increased to 5 ft. 2 in., and the engines were supplied with boilers like those of the rebuilt Armstrong standard 0-6-0's. As in the latter, the wheelbase was 15 ft. 8 in. (in the original "57" class it was 15 ft. 6 in.), but it was made up differently, being 8 ft. leading to driving and 7 ft. 8 in. driving to trailing, as compared with 7 ft. 4 in. and 8 ft. 4 in., respectively, in the Armstrong's. Between 1902 and 1909, some of the engines were fitted with Belpaire boilers having a large dome on the back ring. These boilers, which were of the same size as those adopted for the other double-framed goods tender engines at that period, had a grate area of 15.45 sq. ft., and a total heating surface of 1,275.15 sq. ft. So far as is known, the engines of the "57-68" class which were fitted with them (in the years mentioned) were:—



"ARMSTRONG" 0-6-0 No. 1205, AS REBUILT WITH BELPAIRE BOILER.

No. 57	1906
,, 60	1902
,, 62	1907
,, 63	1907
,, 64	1909
,, 67	1908

The twelve engines comprised in this

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class were condemned on the following dates:—

No.	Date.	No.	Date.
57	.. Nov. 1912.	63	.. Feb., 1912.
58	.. Apl., 1913.	64	.. Dec., 1911.
59	.. Mar., 1912.	65	.. Dec., 1913.
60	.. Apl., 1913.	66	.. Oct., 1912.
61	.. Mar., 1908.	67	.. Apl., 1911.
62	.. Sept., 1911.	68	.. Dec., 1911.

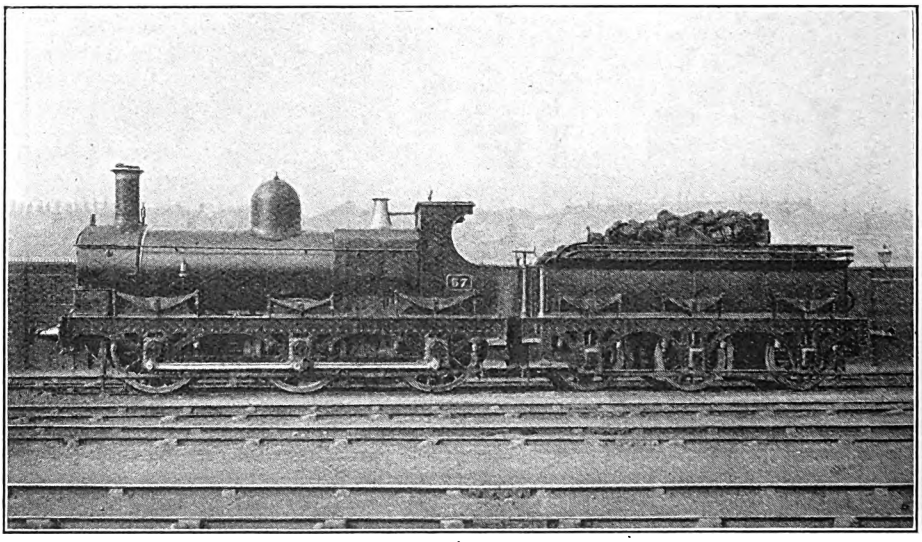
Photo-reproductions are given herewith of No. 1205 (Armstrong standard class), and of No. 57 (Swindon Works No. 1), respectively.

Excluding engines built for lines which were amalgamated with the G.W.R., the principal double-framed 0-6-0's, other than those of the Armstrong series (in addition to the 57-68 class) were: Nos. 79-90 (1857-1858); Nos. 119-130 (1861-1862); Nos. 131-136 and 137-148 (1862); and Nos. 310-319 (1864-1865). All of these were of Gooch's design, and all were constructed at Swindon, except Nos. 137-148, which were supplied by Slaughter & Co., of Bristol (afterwards the Avonside Engine Co.). All, again, had outside "broad gauge" slotted frames, and all originally had 16 in. by 24 in. cylinders, and domeless boilers. In the case of Nos. 79-90 and 119-130, the valve-gear was of Gooch's stationary link type, and the coupled wheels were 4 ft. 6 in. in diameter, but the other engines, Nos. 131-148 and 310-319, had 5 ft. wheels and Stephenson motion.

The next 0-6-0's to be mentioned were thirty outside plate-framed engines, from the works of Messrs. Beyer, Peacock & Co., Manchester, of which Nos. 322-341 were built in 1864, and Nos. 350-359 in 1866. These, which had domed boilers and 5 ft. wheels, had, when new, 17 in. by 24 in. cylinders, and were designed by the makers. The wheelbase was 16 ft. 3 in. (8 ft. plus 8 ft. 3 in.). (See later.)

The majority of the foregoing classes were either renewed or rebuilt (as the case may be) at Wolverhampton. New tender engines numbered 79-90 replaced the old ones bearing these numbers, in 1877-1880. Of the 119-130 lot, all but No. 122 were renewed as saddle tanks in 1879-1883, but as regards the 131-148 and 310-319 batches, the only members renewed were: No. 132 in 1877, No. 135 in 1878, No. 314 in 1878, No. 310 in 1883, and Nos. 311 and 312 in 1884. These were tender engines, and No. 122 was, by the way, also renewed at Wolverhampton as a tender 0-6-0 in 1877. All of these tender engines have now been broken up.

The cylinders of these renewed engines, both tender and tank, were 17 in by 24 in. Most of the renewals were subsequently rebuilt at different times, and



OUTSIDE-FRAMED 0-6-0 No. 57, AS REBUILT WITH BELPAIRE BOILER.

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after 1901 some of the tender engines were finally reconstructed with Belpaire boilers. Such of the "131's" and "310's" as were not replaced were also given 17 in. by 24 in. cylinders, but they were not, strictly speaking, otherwise altered. The "131's" were scrapped in 1883-1886. Eight new double-framed 0-6-0's, numbered 136 and 139, and 141-146, were turned out at Wolverhampton in 1886-1887. The non-renewed "310's" were condemned 1903-1913.

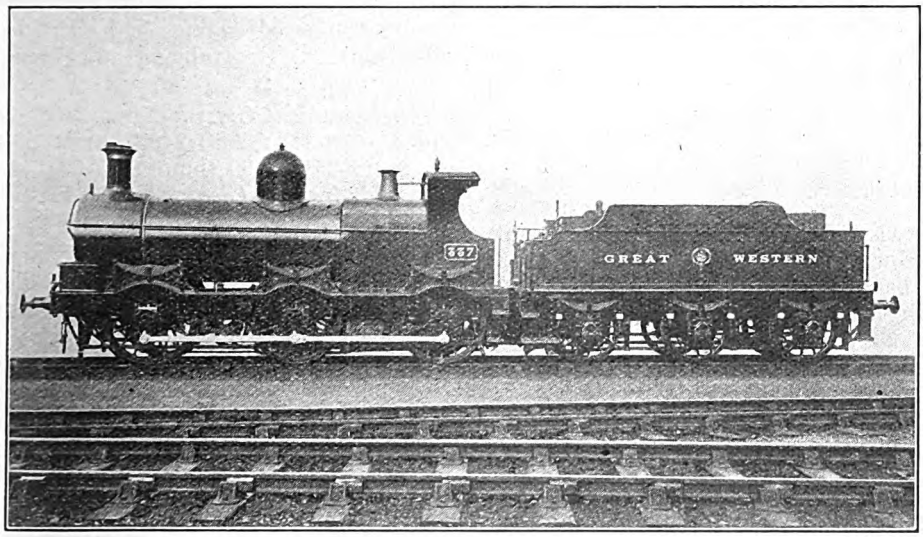
Dealing now with the Beyer-Peacock locomotives, six of these were converted to saddle-tank engines at Wolverhampton in 1878-1885. About 1880 these six were numbered consecutively from 322-327, but three, Nos. 323, 325 and 327, had previously been Nos. 359, 337 and 336 respectively, and the latter numbers were transferred to the corresponding tender engines, which, accordingly, were renumbered as under:—

Old No.	New No.
323	359
325	337
327	336

When the Beyer-Peacock 0-6-0's were rebuilt, only three engines (mentioned further on) retained their old-sized cylinders (17 in. by 24 in.). The cylinder dimensions of the tank engines will be found in the list of those engines. With respect to the tender engines, these, which were first rebuilt at Wolverhampton during the years 1879-1886, were again rebuilt in 1894-1896, and from 1901 most or all of them were fitted with Belpaire boilers. The three which had 17-in by 24-in. cylinders (the original size) were Nos. 351, 354 and 359. Particulars of the others are given below:—

Cylinders, 17½ by 24 in. ..	Nos. 330, 333, 350 and 353.
Cylinders, 17½ by 26 in. ..	Nos. 328, 329, 331, 332, 334–341, 352 and 355–358.

Of the few remaining tender engines of this historic class, Nos. 330, 336 (this one is superheated), 354, 355 and 358 may still be in service. One, No. 352, was withdrawn in 1912 and the others have been broken up since 1919. So far, of these engines, only No. 328 has been condemned. Late in 1912, No. 337 (old No. 325) had already run over one million, two hundred thousand miles. This engine, which was scrapped in April, 1919, is illustrated in the accompanying half-tone block. All of the rebuilds had 5-ft. 2-in. wheels. The comparatively modern domed boilers carried by the engines were similar to those of the Armstrong class, and had a total heating surface of 1,275.20 sq. ft. and a grate area of 15.45 sq. ft.



DOUBLE-FRAMED 0-6-0 No. 337 (FORMERLY No. 325), AS REBUILT. ORIGINALLY BUILT BY BEYER, PEACOCK & CO. LTD., IN 1864.

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While on this subject, I must not omit to mention the conversion to the outside-framed, six-coupled tender type, of twenty-three of the thirty 7-ft. single-wheel express engines of Mr. Joseph Armstrong's celebrated "Sir Daniel" class. The conversion of the twenty-three engines referred to was carried out in 1900-1902, approximately in the following order:—Nos. 385, 387, 472, 473, 580, 581, 582, 583, 585 and 586 in 1900; Nos. 384, 471, 474, 475, 476, 477, 480, 577, 578 and 584 in 1901; and Nos. 379, 380 and 381 in 1902. As 0-6-0's these engines had 17-in. by 24-in. cylinders (as before); 5-ft. 2-in. wheels, 1,366 sq. ft. of heating surface, a grate area of 17.33 sq. ft., and a weight of 34½ tons. The engine wheel base was 16 ft. As the old frames were used, the springs of the driving wheels were on a higher level than those of the leading and trailing wheels. All of these curious 0-6-0's were cut up from 1903-1920. At least one, No. 586, was, I believe, rebuilt with a Belpaire firebox. Otherwise, when converted the engines all had round-topped boilers with a dome on the back ring. The "Sir Daniels" which were not altered to the 0-6-0 type were Nos. 378, 382, 383, 386, 478, 479 and 579 (scrapped: No. 378 in 1898, and the others in 1900-1904).

Of the early *inside-framed* goods engines of the original Great Western stock, I need mention only Nos. 77 and 78. These were ostensibly of Gooch's design, and were built by Messrs. Beyer, Peacock & Co. in 1857. They had Stephenson link motion, domeless boilers, 16-in. by 24-in. cylinders, 5-ft. wheels and a wheel base of 15 ft. 6 in., equally divided. Both engines were subsequently twice rebuilt at Wolverhampton. Domed boilers were fitted, the cylinders were enlarged to 17 in. by 24 in. and the wheels to 5 ft. 2 in. These engines were broken up about twenty-seven years ago.

Mr. William Dean's 0-6-0's, of which there were in reality two distinct varieties, were described in the main series of articles, but illustrations are now provided (1) of the inside-framed series as rebuilt with Belpaire boilers, and (2) of the double-framed class as originally constructed. All have 5 ft. 2 in. wheels. The single-framed engines have 17½ in. by 24 in. cylinders, and a wheelbase of 15 ft. 6 in. (7 ft. 3 in. plus 8 ft. 3 in.), while the outside-framed lot have 17 in. by 26 in. cylinders and a wheelbase of 15 ft. 9 in. (7 ft. 9 in. plus 8 ft.), thus constituting a separate class. Yet the whole series was formerly numbered from 2301 to 2580, of which Nos. 2361-2380 were those of the double-framed group. The numbers borne by the single-framed batches were, therefore, 2301-2360 and 2381-2580. In 1907-1910 twenty of the latter, Nos. 2491-2510, were rebuilt as 2-6-2T's, and were renumbered, though not in the same order, 3901-3920. As before, they had 17½ in. by 24 in. cylinders and 5 ft. 2 in. driving wheels, but the rigid wheelbase was altered to an equally divided one of 14 ft. These twenty converted engines had extra long side tanks. Rearranging the tender batches, we get:—

Single-framed Class: Nos. 2301-2360 (built 1883-84); 2381-2490 (built 1890-96); and 2511-2580 (built 1897-99).

Double-framed Class: Nos. 2361-2380 (built 1885-86).

Several of Mr. Dean's 0-6-0's have been scrapped, and some have already been withdrawn this year, such as Nos. 2304, 2306 and 2318.

Another matter to which these notes give me an opportunity to refer is that, at odd times, some of the engines of the "Duke of Cornwall" class of 4-4-0's were temporarily furnished with domeless boilers. An official list of the "Dukes" which were so fitted is given on the next page.

The case of No. 3278 (formerly No. 3289) is especially interesting, for the reason that this engine, after being re-provided with a domed boiler in December, 1923, was again put into service with a non-domed one in April, 1926, but was, in March of the present year (1929), once more fitted with a boiler of the domed kind.

I have a record in one of my notebooks to the effect that three other members of the "Duke" class were given domeless boilers, viz., No. 3253 (old No. 3254) *Boscawen*; No. 3265 (previously No. 3271) *Tre Pol and Pen*; and No. 3281 (formerly No. 3313) *Cotswold*. The first-mentioned two belong to the original "Duke" series, and possibly had domeless boilers fitted in 1904 or 1905; the third engine, old No. 3313, one of the

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Old No.	New No.	Name.	When Built.	Date Fitted Domeless Boiler.	Date Re-Fitted Domed Boiler.
3266	3262	*St. Ives*	1896	June, 1910 ..	December, 1913.
3267	3263	*St. Michael*	,,	March, 1906 ..	May, 1908
3276	3269	*Dartmoor*	,,	March, 1906 ..	December, 1909
3277	3270	*Earl of Devon*	1897	November, 1907 ..	September, 1909
3289	3278	*Trefusis*	,,	November, 1907 ..	December, 1923
,,	,,	,, ...	,,	April, 1926 ..	March, 1929
3291	3280	*Tregenna*	,,	October, 1913 ..	January, 1923
3328	3290	*Severn*	1899	March, 1909 ..	November, 1911

LIST OF "DUKE OF CORNWALL" CLASS 4-4-0's TEMPORARILY FITTED WITH DOMELESS BOILERS.

later series, and transferred to the "Duke" class, is noted as having been provided with a non-domed boiler in 1906. I give this information advisedly, as none of these three is cited in the Swindon list.

The year in which two of the crane engines, Nos. 17 and 18, were built was at first given as 1901, instead of 1903. The actual dates of the three tank engines of the 0-6-4 crane type are:—

No. 16 *Hercules* .. .. February, 1922.
,, 17 *Cyclops* .. .. April, 1901.
,, 18 *Steropes* .. .. April, 1901.

The mistake in question was due to a misunderstanding.

When No. 6000, *King George V*, the first of the super-pressure 4-6-0's, was shipped to America on August 3, 1927, in connection with the centenary of the Baltimore and Ohio Railroad, it was accompanied, as a second exhibit, by the full-size replica of Stephenson's 7 ft. single, *North Star*, of 1837. As regards externals, this replica, which had been made at Swindon for our own railway centenary celebrations in 1925, represented the original engine as supplied by Messrs. Robert Stephenson & Co. for the broad gauge of the Great Western Railway in 1837. Mr. W. A. Stanier was in charge of the two exhibits, and with him went driver Young and fireman Pierce and a number of fitters, the latter for the purpose of erecting No. 6000 on its arrival in the United States, and the former for the purpose of afterwards testing the engine in steam and on the road. The Great Western Railway Company itself was represented at the Baltimore and Ohio Railroad celebrations by Sir Felix Pole, then the General Manager of the Great Western Railway, a post which Sir Felix has recently resigned.

The order for fifty 0-6-0 pannier tank engines, Nos. 5700-5749, has lately been completed by the North British Locomotive Co., Ltd., by the delivery of Nos. 5744-5749. Of the same type and class, Nos. 5750-5769 have so far been turned out by the Great Western Railway at Swindon.

On July 1, 1929, occurred the 25th anniversary of the inauguration of the now world-famous "Cornish Riviera" express. First put into service on the corresponding date of the year 1904, this train originally left Paddington at 10.10 a.m. and covered, without an intermediate stop, the then distance of 245¾ miles to Plymouth—by the old route—in 4 hr. 25 min. When the shorter route of 225¾ miles, *via* Castle Cary, was opened on July 1, 1906, the departure time from London was altered to 10.30 a.m., and the run to Plymouth occupied 4 hr. 10 min., until October of the same year, when the time allowance was reduced to 4 hr. 7 min. During the latter part of the war period, as from January, 1917, stops were made at Westbury, Taunton, Exeter and Newton Abbot, and the train temporarily became the 10.15 a.m. *ex* Paddington. In July, 1919, the old departure time of 10.30 was restored, but the journey time to Plymouth was slightly increased as compared with that obtaining before the war, viz., to 4 hr. 15 min. The odd 15 min. were, however, knocked off in September, 1927, the construction of the powerful new "King" class rendering this course possible. Instead of 6 hr. 30 min., Pen-

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zance was reached in 6 hr. 25 min., and this latter time has since been reduced by 5 min. The 173¾ miles from Paddington to Exeter (passing) are now (summer) booked to be covered in 171 min. 30 sec., the overall speed to Plymouth, 225¾ miles, in the even 4 hr., being 56.5 m.p.h.

A feature of the running of this deservedly popular express (which, formerly confined to the summer months, was, after July 21, 1906, run in the winter also) has been the inclusion of coaches "slipped" at Westbury, Taunton and Exeter, but the arrangements in this connection are modified to suit the exigencies of traffic, especially during the busy holiday seasons. During the summer 1929 there was one "slip," viz., at Westbury, where two coaches were dropped. During the winter service of 1929 a stop is made at Exeter.

In 1904, the train consisted of seven carriages weighing in round figures, 180 tons. For the purpose of commemorating the 25th anniversary of the "Cornish Riviera" express, new coaches have been specially built for it, and each up and down train is normally comprised of thirteen 60 ft. fire-proof, electrically-lighted, vehicles, the combined weight of which is approximately 450 tons.

The difference between the respective weights of the first and the latest trains serves to show how successful has been the policy of the Great Western Railway authorities in instituting this notable express, which, on at least one occasion, was run in as many as five separate portions, so well was it patronised by holiday makers. The recent summer services of the Great Western Railway were described in the August issue, but I may just add that the accelerated running of the "Cheltenham Flyer," the booked speed of which from Swindon to Paddington is now 66.2 m.p.h., affords yet another example of Great Western Railway organisation and progressiveness, and one that is of a decidedly commendable character.

The "Cornish Riviera" express was at first worked by the 4-4-0 "Cities," but as the load grew beyond the capacity of those engines, the running of the train was entrusted to the 4-6-0's, such as the two-cylinder "Saints" and the four-cylinder "Stars," and more recently (preceding the "Kings") by the four-cylinder "Castles."

I desire to acknowledge, with thanks, the receipt of appreciative letters from Lt.-Col. J. L. Vaughan, Mr. M. D. England, Mr. G. C. T. Turner, Mr. F. H. C. Casbourn, and others.

Mr. G. Templer asks me to mention that "Met." 2-4-0T's Nos. 3561-3570 were fitted with longer tanks, like those of Nos. 3581-3599, 3500, and 1401-1420. The Swindon list omitted the 3561-70 batch.

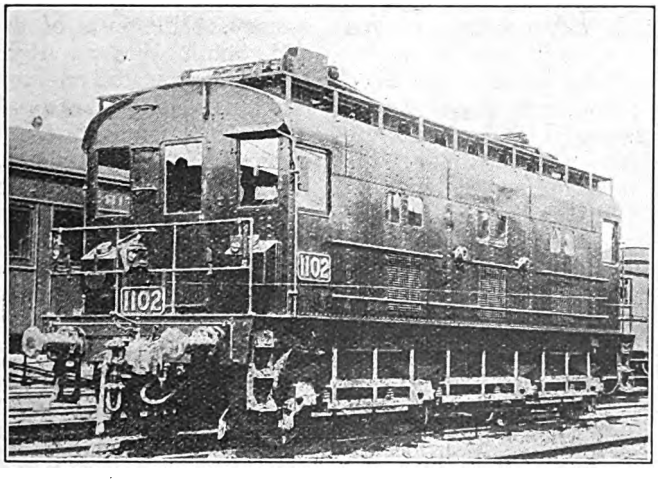

Photo.] [*Topical.*

NEW ELECTRIC GOODS AND SHUNTING LOCOMOTIVE, VICTORIAN GOVERNMENT RAILWAYS.

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The Main Line Gradients of British Railways.

XIII.—LONDON MIDLAND & SCOTTISH RAILWAY, NORTHERN DIVISION; MAIN AND PRINCIPAL BRANCH LINES, GLASGOW & SOUTH WESTERN SECTION.

By "VOYAGEUR."

THE main line of the late Glasgow and South Western Railway between Carlisle and Glasgow, viewed from the grading point of view, falls into three well-marked divisions. These three divisions are separated by the two chief intermediate towns on the route—Dumfries and Kilmarnock. From Carlisle to Dumfries the grading is easy; between there and Kilmarnock it steepens to a maximum of 1 in 150 on the south side and 1 in 99 on the north side of the central "plateau," there being substantial stretches at both these inclinations; while from Kilmarnock to Glasgow the Barrhead direct route has two stiff ascents at between 1 in 67 and 1 in 87. In regard to grading, the last-mentioned stretch is a poor exchange for the original route from Glasgow to Kilmarnock through Paisley and Dalry, which is dead level throughout, but the former cuts the distance to Carlisle from 125.6 to 115.5 miles—a clear saving of ten miles.

On the whole, the grading of the Glasgow and South Western line between Gretna and Glasgow is easier than the one-time rival Caledonian route; the summit level at Polquhap Siding, between New and Old Cumnock is, in fact, but 616 feet above the sea, against the 1,014 feet of the neighbouring Beattock Summit. But the greater length of the Glasgow and South Western route from Carlisle to Glasgow—115½ as against 102½ miles—together with the stops necessary at the important junction stations of Dumfries and Kilmarnock—never permitted the Glasgow and South Western Company to draw level with the Caledonian in the matter of schedule time. Indeed, the booking of 2 hrs. 22 min. from Carlisle to Glasgow by the one-time 1.30 p.m. from St. Pancras was very creditable, over such grading, and with the considerably heavier train-loadings of to-day such time allowances as 67 min. for the 58 miles from Dumfries to Kilmarnock leave nothing to spare.

The remainder of the sections profiled include the two approaches to Stranraer, one from Dumfries through the counties of Kirkcudbright and Wigtown, and the other south-westwards from Ayr, in both cases over grades of extreme severity. In singular contrast, the busy Clyde Coast section from Glasgow to Ayr, forming the main route from Glasgow to Stranraer, is practically dead level throughout. Branching from this just beyond Elderslie, the old Glasgow and South Western route through Kilmacolm to Greenock is another mountainous section, again contrasting with the almost level Caledonian Greenock and Gourock line along the south bank of the Clyde estuary. Mile-posts of the old Glasgow and South Western Railway were all measured from the one-time Bridge Street terminus, long since abolished; the equivalent point on the main line out of St. Enoch is Cumberland Street Station. It is also singular that on all routes, conformably with the main line to Carlisle, "up" was reckoned as from Glasgow, and "down" as to Glasgow, but the normal method in relation to London is now followed.

CARLISLE TO GLASGOW (ST. ENOCH) VIA *DUMFRIES* (Sheets 25 and 26).

As far as Gretna Junction the same metals are shared with the trains of the Caledonian section. At Gretna a beautifully aligned junction has been laid out,

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permitting of practically full speed in either direction of running. As far as Dumfries the only gradients worth mention are comprised in the short ascents to the summit a mile beyond Ruthwell Station, at 1 in 200 from the south, and for 2 miles at 1 in 150 to the north. It is not until 5 miles beyond Dumfries, and 1¾ miles beyond the station at Holywood, that climbing begins in real earnest. For 12¾ miles there are now rising grades continuously, the only intermission being the one level mile just below Closeburn; to Closeburn Station the rise is at 1 in 200, and above that for 6 miles almost entirely at 1 in 150. At the south portal of Drumlanrig Tunnel the grade changes and the mileage to this point is given, as the tunnel entrance makes a useful timing point. Broken grades now ensue for 4½ miles, during which the railway is passing through the magnificent scenery of the Nith Valley. From 55½ miles the climbing is resumed for 10 miles, but on easier grades, the worst of which are 4 miles at 1 in 180-215 up to Sanquhar and 3½ miles at 1 in 200 past Kirkconnel. At 32½ miles from Dumfries the climbing is at an end, and then ensues a kind of table-land for 7 miles, graced by the most loftily-situated track-troughs in Scotland, ere the falling grades begin at Polquhap Siding. Polquhap Box, by the way, is little more than a ground-frame, and may easily be missed. The descent northwards is much steeper than the ascent from the south. It begins with 3 miles steepening from 1 in 175 to 145, down to Old Cumnock; it continues with 3½ miles at 1 in 180-150 from Auchinleck; and it culminates in the tremendous drop from Mossgiel Tunnel towards Hurlford, for 4½ miles at 1 in 100 or thereabouts. To maintain average speeds in excess of 50 m.p.h. over such a route as this is clearly a fine feat of locomotive performance.

Then comes the final section into Glasgow. After the initial rise at 1 in 180 from Kilmarnock to Kilmaurs, the first serious stage of Stewarton bank is at 1 in 87 for 1½ miles, followed, after 1¼ miles' intermission, mostly at 152, by 1¾ miles up at 1 in 75 to the 17 mile-post. There is then a "plateau" of just over 6¼ miles in breadth to the 10¾ mile-post, whence there drops the exceedingly abrupt Neilston bank, for the 3½ miles from the 10½ post to Barrhead entirely at 1 in 70-67. Another mile at 1 in 100 ushers in a descent on gentler grades all the way to Glasgow. The now closed signal box at Shilford usefully marks the beginning of Neilston bank. It should be added that, owing to much reverse curvature on the various falling grades, particularly between Auldgirth and Closeburn, Drumlanrig Tunnel and Mennock, at Mauchline and Stewarton and from Neilston to Barrhead, it is customary to keep the downhill speeds over this section at a moderate figure, though these curves are in few instances of less than half a mile radius. Coalmining, also, is responsible for slacks owing to pitfall subsidences between New Cumnock and Mauchline, especially at Barony Junction, Mauchline, which has now become a permanent speed restriction.

DISTANCES.

Mile-posts, down side, Carlisle (zero) to Gretna Junction; up side, Gretna Junction to Kilmarnock, from zero at Glasgow, Bridge Street (now abolished) via Paisley and Dalry; and up side Kilmarnock to Glasgow, from zero at Gorbals Junction.

	Miles.
CARLISLE (CITADEL)	0·0
Caldew Junction No. 3 (up)	0·7
Kingmoor (down)	2·0
Rockcliffe	4·1
Floriston	6·1
GRETNA JUNCTION	8·6
Gretna Green	9·6
Rigg	11·7
Eastriggs	14·6
ANNAN	17·6
Cummertrees	21·0
Ruthwell	24·6
Racks	29·2
Harehill Junction (up)	32·3
DUMFRIES	33·1
Cairn Valley Junction (down)	34·8
Holywood	36·5
Auldgirth	40·7
Closeburn	44·5
THORNHILL	47·3
Carronbridge	50·6
Drumlanrig Tunnel S. End (no box)	51·0
Ardoch (down)	54·3
Mennock Siding (up)	56·9
Sanquhar	59·2
Kirkconnel	62·5
Upper Cairn (down)	66·5
New Cumnock	70·0
Polquhap Siding (down)	72·5
Old Cumnock	75·3
Auchinleck	77·3
Brackenhill Junc. (up)	79·9
MAUCHLINE	81·7
Mossgiel Tunnel N. end (no box)	83·6

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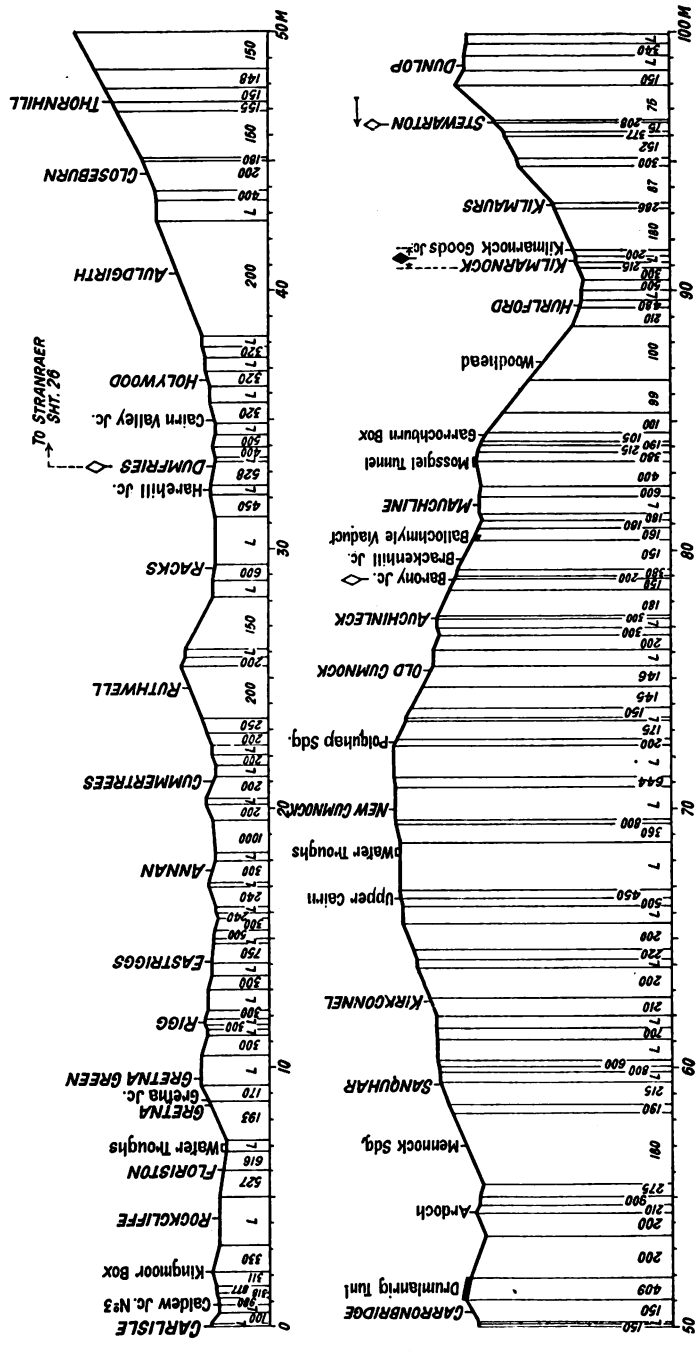

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		Miles.
Garrochburn (up)		84·4
Woodhead (up)		87·1
Hurlford		89·3
	Miles.	
KILMARNOCK	91·1	91·1
Crosshouse	93·0	
Cunninghamhead	95·2	
Mountgreenan	97·4	
DALRY	102·3	
GLASGOW (ST. ENOCH)	125·6	
Kilmaurs		93·3
Stewarton		96·6
Dunlop		98·8
Lugton		101·1
Caldwell		102·7
Shilford (up) (*closed*)		104·3
Neilston		105·8
BARRHEAD		107·9
Nitshill		109·6
Kennishead		110·9
Busby Junction (up)		111·7
Pollokshaws		112·2
Crosmyloof		113·1
Strathbungo		113·6
Gorbals		114·7
GLASGOW (ST. ENOCH)		115·5

DUMFRIES TO STRANRAER
(Sheet 26).

This route, followed by the North of Ireland boat express trains from London, nightly throughout the year and by day also in summer, is exceedingly difficult throughout. Over the old Glasgow and South Western section to Castle Douglas it is double line, but from there to Stranraer—the one-time Portpatrick and Wigtownshire Joint Railway—single-line working prevails throughout. Only 2½ miles from the Dumfries start there comes the climb to Lochanhead, for 3¼ miles at 1 in 73, but beyond the sharp rise on both sides of the Dalbeattie "dip," the going is then easier to Castle Douglas, and practically level from there to New Galloway. In the next 18 miles the worst gradients of this section are concentrated. The 4 miles from New Galloway up to Loch Skerrow platform are almost entirely at 1 in 80, and then, after sharp undulations at this figure to Gatehouse of Fleet, the highest point on the route, there is the tremendous Creetown bank, for 7¼ miles, with one trifling intermission, at 1 in 80. Difficult, though shorter, grades continue, notably the climb from the 28 to the 32½ mile-post, and then the lengthy descent from the 40¾ mile-post to Luce Viaduct, largely at 1 in 83-90. At Challoch Junction the Glasgow line comes in from the north, and a mile down at 1 in 88 completes the run into Stranraer. The line to Stranraer Harbour forks to the right at Stranraer Junction before Stranraer Station is reached ; the main line continues through Stranraer up a 4-mile incline at 1 in 72, and down 3¼ miles, of which 2 are at 1 in 57, to Portpatrick.

DISTANCES.

Mile-posts, down side, Dumfries (Castle Douglas Jc.) (zero) to Castle Douglas, and Castle Douglas (zero) to Stranraer.

		Miles.
DUMFRIES		0·0
Maxwelltown		1·9
Lochanhead		6·0
Killywhan		8·2
Kirkgunzeon		10·4
Southwick		12·5
Dalbeattie		14·5
CASTLE DOUGLAS		19·8
Crossmichael		23·4
Parton		26·6
New Galloway		28·7
Loch Skerrow Platform		32·7
Mile-post 16 (*summit*)		35·7
Gatehouse of Fleet		38·7
Creetown		43·3
Palnure		46·4
NEWTON STEWART		49·7
Mile-post 32½ (*summit*)		52·2
Kirkcowan		55·9
Mile-post 40¾ (*summit*)		60·5
Glenluce		64·3
Challoch Junction (down)		66·5
Dunragit		67·7
CASTLE KENNEDY		70·5
	Miles.	
Stranraer Jc. (up)	72·7	72·7
STRANRAER	73·1	
STRANRAER HARBOUR		73·8

GLASGOW TO AYR & STRANRAER
(Sheets 26 and 27).

The two ends of this main line, almost exactly 100 miles in length, are, from the grading point of view, in striking contrast. In the first 41½ miles to Ayr, apart from the very short descent from Port Eglinton Junction to Shields Road, there is not a gradient worth mention ; from Ayr to Girvan, on the other hand, there are some stiff grades ; while the section from Girvan to Challoch Junction is one of the hardest in Scotland. Between Ayr and Girvan, Dalrymple Junction and Maybole represent the two chief summit points, the 2½ miles' rise at 1 in 88-70 to the former, and the almost precisely similar grade from Girvan North Junction past Killochan, in the opposite direction, with 2 miles mostly at 1 in 72, being the worst grades. From Girvan there follows immediately a terrible test of locomotive capacity. For 3¾ miles,

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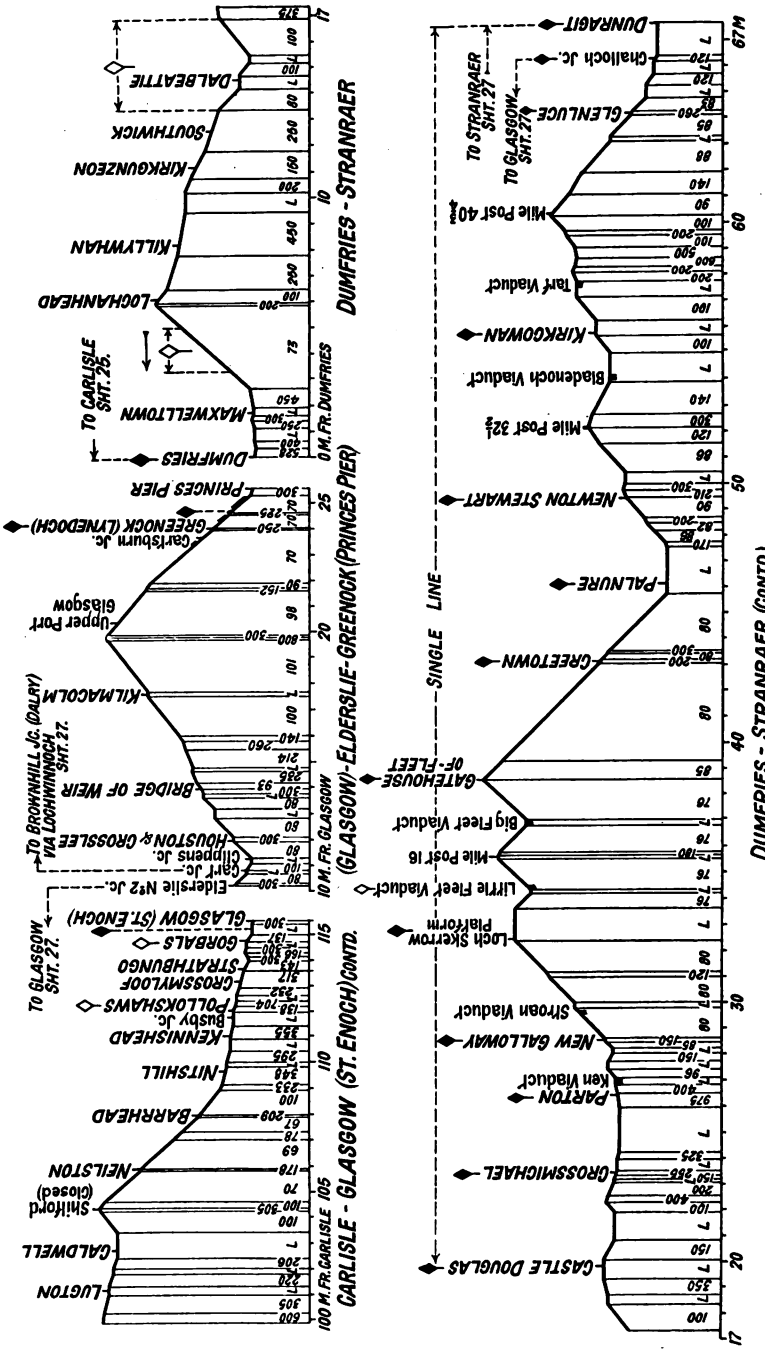

SHEET 26.—GRADIENT PROFILES, LONDON MIDLAND & SCOTTISH RAILWAY

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to mile-post 4, the gradient is practically unbroken at 1 in 54-56. The north portal of the short tunnel here, at 3.9 miles from Girvan, is a useful timing-point. Immediately follows the 4¼-mile descent to Pinwherry, of which 1¾ miles only are as steep as 1 in 69-65. Then comes another tremendous ascent, all but 8 miles in length, including exactly 6 miles inclined at between 1 in 67 and 73. Mile-post 16½ here marks the summit point. On the first stage of the descent, to Glenwhilly, the worst 3½ miles do not average more than 1 in 100 in steepness; but after a short and steep rise to the 21¾ mile-post, there is an abrupt drop of 3 miles at 1 in 57-58 to New Luce, with easier falling grades subsequently to Challoch Junction. Great care has to be exercised on the falling gradients, which are in most cases infested with curves at 30 to 40 chains' radius; only in the case of curves of 20 chains' radius or less have special slacks been indicated. At every station, also, there is a severe slack in order to take the passing loop and exchange the single-line tokens.

DISTANCES.

Mile-posts, down side (from zero) at old Bridge Street Terminus (now abandoned) to Girvan, No. 2 Junction, via Glengarnock; up side, Girvan, No. 2 (zero), to Challoch Junction, and down side, Challoch Junction to Stranraer, from zero at Castle Douglas.

	Miles.	Miles.
GLASGOW (ST. ENOCH)		0·0
Cumberland Street		1·0
	Miles.	
Shields Road	1·6	1·6
Bellahouston	2·5	
Corkerhill	4·2	
Crookston	5·5	
Hawkhead	6·9	
PAISLEY (CANAL).. ..	8·2	
Paisley (West)..	8·8	
Ibrox		3·1
Cardonald		4·2
Arkleston Junction (up)..		6·6
PAISLEY (GILMOUR STREET) ..		7·7
Elderslie	10·2	9·7
Elderslie No. 2 Junction (down)	10·1	10·1
Cart Junction (up)	10·7	
Johnstone North	11·5	
Kilbarchan	12·7	
Lochwinnoch	16·9	
Kilbirnie	20·4	
Johnstone		10·9
Milliken Park		12·3
Howwood		13·8
Lochside		16·5
BEITH (NORTH)		18·6
Glengarnock		20·6
Brownhill Junction (up) ..	22·4	21·6
DALRY	24·1	23·3
Dalry No. 3 Junction (up) ..	24·7	23·9

	Miles.	Miles
KILWINNING	27·6	26·
Bogside		29·1
IRVINE		30·2
Gailes		32·1
Barassie	33·8	33·8
TROON	34·9	
Troon Goods Station		34·9
Lochgreen Junction (down) ..	36·1	35·9
Monkton		37·4
Prestwick		38·3
Newton-on-Ayr		40·3
AYR		41·4
Alloway Junc. (up)		42·3
Dalrymple Junction (down)		44·7
Dalrymple		45·6
Cassilis		47·6
MAYBOLE		50·4
Kilkerran		54·8
Dailly		57·5
Killochan		60·2
Girvan No. 2 (Goods) Junction (up) ..		62·6
GIRVAN..		62·8
Mile-post 4 (summit)		66·5
North end of Tunnel		66·7
Pinmore		67·7
Pinwherry		70·9
Barrhill		75·0
Mile-post 16½ (summit)		79·0
Glenwhilly		83·5
Mile-post 21¾ (summit)		84·3
New Luce		87·9
Challoch Junction (down)		93·4
Dunragit		94·6
CASTLE KENNEDY		97·4
Stranraer Junction (up).. ..	99·6	99·6
STRANRAER	100·0	
STRANRAER HARBOUR		100·7

GLASGOW (ST. ENOCH) TO GREENOCK (PRINCES PIER) (Sheet 26).

Trains for Greenock (Princes Pier) follow the Ayr main line as far as Elderslie No. 2 Junction, whence they drop sharply to Cart Junction. Here there diverges to the left the relief Ayr route, which passes through North Johnstone, and along the west side of Loch Winnoch, joining the main line again at Brownhills Junction. This loop route is heavily graded, and also nearly a mile longer than the direct route through Beith (North). From just beyond Cart Junction the Greenock route begins to ascend, first at 1 in 80 for 1½ miles, then more easily, but finally at 1 in 100 for 3¾ miles, to the 19 mile-post. But this ascent is modest in comparison with the descent to Greenock, which faces the drivers of up trains from Princes Pier as a most formidable start. For 3¼ miles from the Pier station, practically without a break, it rises at 1 in 70, followed by 2 miles mainly at 1 in 98. The work done until

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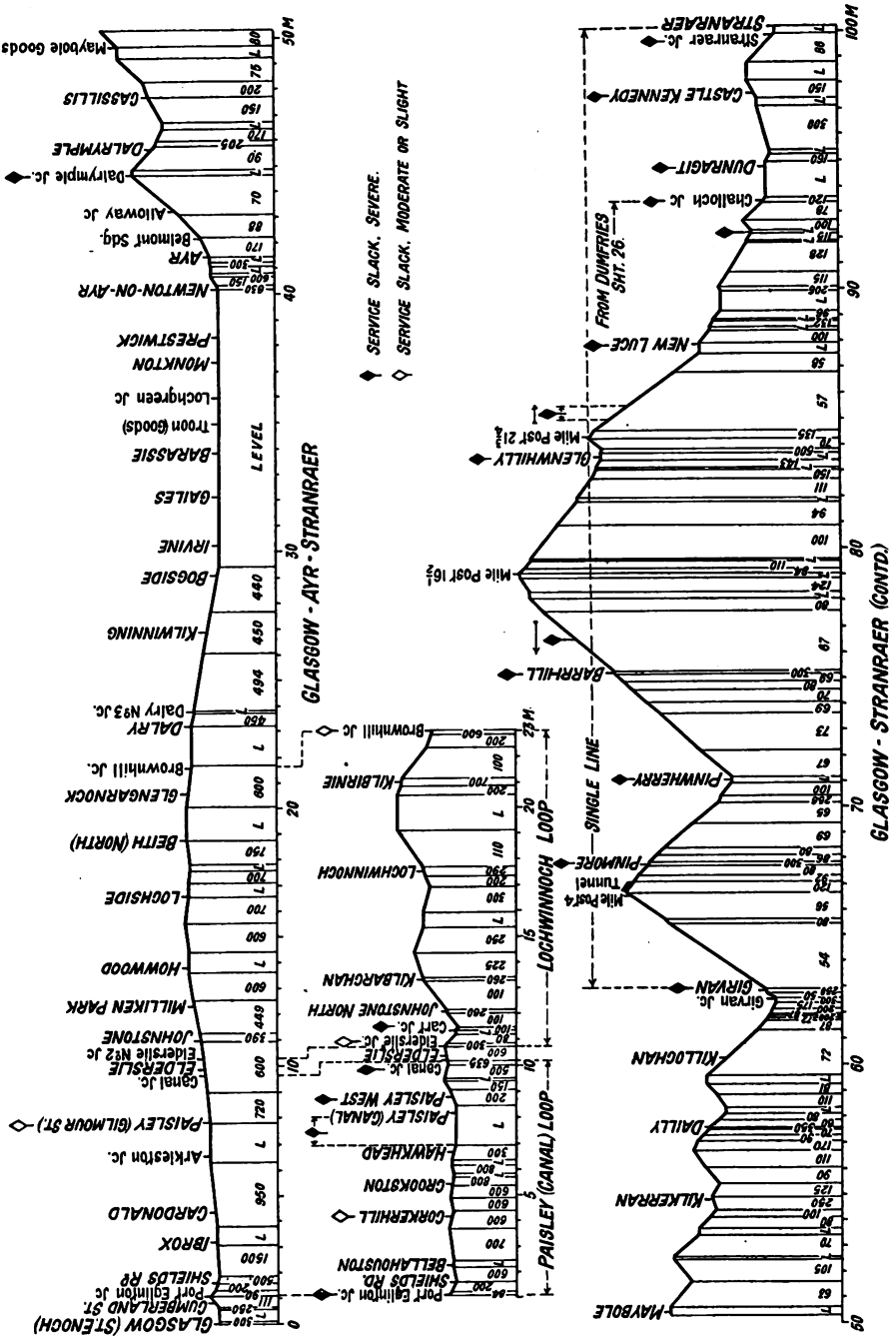

SHEET 27.—GRADIENT PROFILES, LONDON MIDLAND & SCOTTISH RAILWAY.

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recently by the diminutive Glasgow and South Western small-wheeled 4-4-0 engines over this course with the substantial Clyde Coast trains has been little short of remarkable. The profile is also given of the alternative line from Shields Road to the Canal Junction at Elderslie *via* Paisley (Canal) Station, passing *en route* the locomotive depot at Corkerhill. This is half a mile longer than the Gilmour Street route, but is used by a number of the fast trains in the Ayr, Largs and Fairlie directions, as a relief to the main line proper, but its sharp curvature is a serious hindrance to fast running.

DISTANCES.

Mile-posts, down side, from zero at old Bridge Street Terminus (now abolished) to Greenock.

	Miles.
GLASGOW (ST. ENOCH)	0·0
PAISLEY (GILMOUR STREET) ..	7·7
Elderslie	9·7
Elderslie No. 2 Junction (down) ..	10·1
Cart Junction (up)	10·7
Houston and Crosslee	11·8
Bridge of Weir	13·8
Kilmacolm	17·4
Upper Port Glasgow (down)	20·3
GREENOCK (LYNEDOCH)	23·9
GREENOCK (PRINCES PIER) ..	25·5

1929 SUMMER TRAIN SERVICES.

It is almost inevitable that in an extensive collection of figures such as that presented in the annual review of "British Express Trains in the Summer of 1929" some inadvertent errors should creep in. Our contributor "Mercury" is indebted to various correspondents who have written to call attention to minor omissions, which may now be mentioned. Mr. G. J. Aston points out that on the Cheshire Lines Committee's system there is still one one-stop run retained between Liverpool and Stockport, by the 1.18 p.m. eastbound express, taking 45 min. for the journey of 37.7 miles (=50.3 m.p.h.), and that this should therefore figure as the longest C.L.C. run in Table D. Also, as the 10.8 a.m. from Manchester to Liverpool takes the straight line at Warrington, the distance from Manchester to Farnworth is only 21.5 miles, reducing the start-to-stop speed to 51.6 m.p.h., so that pride of place among C.L.C. trains, in the table of fastest start-to-stop runs, is still retained by the lengthy series of hourly expresses which cover the 15.7 miles from Manchester to Warrington in 18 min., at an average rate of 52.3 m.p.h. By a printer's error there was dropped out of the table of fastest runs the L.M.S. Midland Division run of the 8.25 a.m. from St. Pancras, which, leaving Luton at 9.4 a.m., covers the 41.8 miles from Luton to Kettering in 43 min., at a start-to-stop average of 58.3 m.p.h. In the same table the time of the 12.31 a.m. from Bishops Stortford to Cambridge should have been shown as 29 min., and not 31 min.; the average speed figure here is, however, correct.

As regards particulars of restaurant cars, Mr. R. Angus-Lewis calls attention to the omission of any reference to the Welsh Highland Railway, which served teas during the summer from a species of buffet car, which was run in each direction daily over the line—surely a record on a gauge of 1 ft. 11½ in.! But he qualifies his suggestion as to inclusion by reference to our title, "British *Express* Trains"! Captain G. Cullis mentions a particularly interesting post-summer development, in that, for the first time in its history, the Somerset and Dorset Railway has begun the practice of slipping coaches. A slip coach is now detached daily at Templecombe from the 11.35 a.m. express from Bournemouth to Bath; the coach is then worked from the low level up to the Southern station at Templecombe, arriving at 12.47 p.m. New slip coach services are rare indeed in these days. Lastly, Mr. F. Martyn Johnson suggests the inclusion of the old G.N. service from King's Cross to Cambridge and the Brighton service from London to Hastings in Table A. But as the result of grouping has been to divert the bulk of traffic from these routes to the routes recognised by each railway as the main routes to the places concerned, and the services cited have been materially reduced in consequence, there seems no point in their inclusion.

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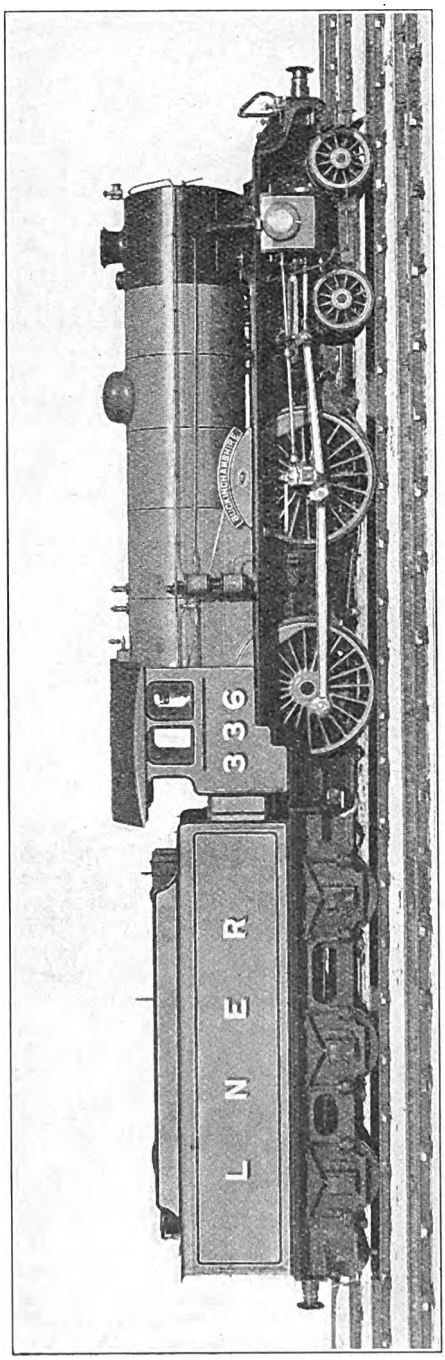
London and North Eastern Railway 4-4-0 Locomotive Fitted with Poppet Valves.



TWO of the London and North Eastern Railway 4-4-0 3-cylinder express passenger locomotives, Nos. 336 and 352, have recently been fitted with a rotary cam poppet valve gear supplied by the firm of Lentz Patents, Limited, and, by the courtesy of Mr. H. N. Gresley, C.B.E., Chief Mechanical Engineer, we are enabled to reproduce a photograph of No. 336, *Buckinghamshire*. The arrangement adopted is the "R.C." (rotary cam) poppet valve gear, and consists of a camshaft which obtains a rotary motion by means of suitable gears and shafting so arranged that the rotation of the camshaft can be synchronised with that of one of the coupled axles. As applied to the locomotives referred to, the camshaft is placed horizontally above the cylinders with its axis at right angles to the centre line of the locomotive. The steam inlet cams for each cylinder are made in two separate sections; those for forward-gear running provide for five different rates of admission, ranging from a minimum cut-off of 15 per cent. to a maximum of 75 per cent. in full gear; whilst for back-gear running a further set of cams are used which give two rates of admission: one for full gear and the other giving a shorter rate of cut-off of 35 per cent. In addition, there is provided a cylindrical cam for each cylinder for the purpose of closing the steam valves when the engine is placed in mid-gear, in which position the exhaust valves are held open by a similar cam of larger diameter in the exhaust set. The arrangement of the exhaust cams is somewhat similar, but only three different profiles are provided. Separate exhaust cams enable the point of release to be adjusted to suit the cut-off, and in this instance release takes place at 90 per cent. in full gear and 80 per cent. for all other cut-offs. The arrangement of the valves is entirely similar to that employed with the oscillating cam type of gear which utilises a link motion.

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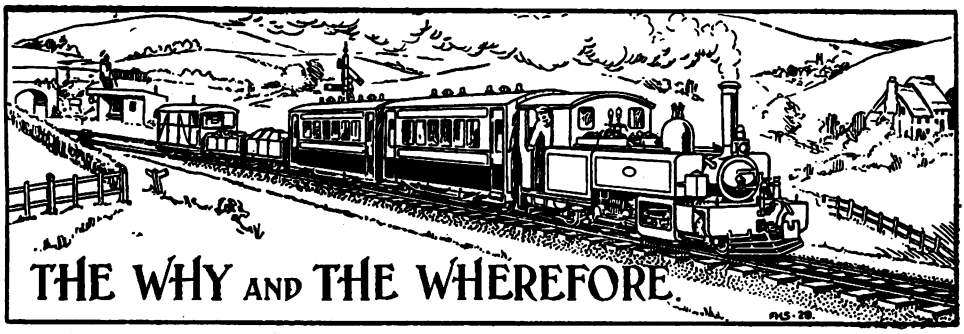

RAILWAY MAGAZINE *readers desiring information should mark envelopes " Query " in the upper left-hand corner, and address them to the Editor. Questions relating to the dimensions and weights of railway rolling-stock and to names, numbers, dates, &c., of locomotives should not be forwarded. No reader should send more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history or " grouping," the pages of the " Railway Year Book " (5s. net) should be consulted. The thirty-second Annual Edition* (1929) *of this standard railway reference work is now published. All previous Editions are out of print.*

Slip Coaches.

In cases where more than one slip portion is run on any one train, and the two or three portions are detached without any stoppage intermediately, all the slip couplings are adjusted before starting, and it necessarily follows that the coupling joining the innermost slip to the main train has to sustain the pull on all the coaches composing the slips. When the " Cornish Riviera Express " of the Great Western Railway carried three slip portions, these invariably added up to six vehicles in the summer, and occasionally to seven, in which case the gross weight of the three slips was over 250 tons. But the slip coupling is designed to be in no degree inferior in strength to an ordinary coupling. The through Kingsbridge coach on this train formed part of the Exeter slip portion, when this train slipped at Exeter.

[Reply to LT.-COL. P. N. G. READE.]

Special Train Workings.

We have no precise information as to the disposal of the train staff (restaurant car staff and guards) on the special through express which ran on Mondays, Fridays and Saturdays between Liverpool, Manchester, Yarmouth and Lowestoft, by the L.M.S. route. The custom with all such intermittent workings is, however, for the staff to travel back as passengers to their own system, after working their train through to destination, on the Monday evening or Tuesday morning, and to return " passenger " to take up the workings again on the Friday. Between the Monday and the Friday they are employed on other duties. The stock, unless required for any special purpose, remains at destination until the following week-end.

[Reply to " HAZELWOOD."]

G.N.R. 8-ft. Singles.

We cannot say what was the last date or where No. 1 was engaged, but most of these engines finished their days on Lincolnshire branch lines. Engines of this class were occasionally in London well into the present century, but not after about 1907. We are obliged for particulars of through electric trains in connection with Watford *v.* Fulham football match on November 9, leaving Hammersmith at 1.9 p.m. and travelling *via* Baker Street on a through booking for Watford. Your letter was unsigned.

[Reply to " 72, CAMBRIDGE GARDENS."]

The New Charing Cross Station.

The words to which you take exception are those stated officially. We gather that their purport is really that the distance between the new station across the new bridge and the present " Underground " station on the Embankment will not be greater, at least appreciably, than that

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from the latter station to the Strand entrance to the present Charing Cross station, though the latter distance can at present be considerably shortened by using the stairway down to Villiers Street.

[Reply to LT.-COL. P. N. G. READE.]

Working of Nord "Pacifics."

The details of locomotive working to which you refer were supplied by a Paris correspondent, and the writer of "Modern Locomotive Work in France" had no means of checking their accuracy. It is possible, however, for the steam pressure in the l.p. steam chest of these engines to be maintained at a uniform figure, despite variations of the h.p. steam-chest pressure and of the cut-off in the h.p. cylinders, by reason of the variable blast-pipe with which they are fitted. The driver is in a position to vary the effective diameter of the blast orifice at will.

[Reply to S. ROLFE.]

L.M.S. Lines in Leeds.

The Western Division main line of the L.M.S. from Leeds to Liverpool leaves New Station at Leeds alongside the Midland Division line out of Wellington, and after a short distance thus adjacent, during which junctions are effected between the two, bears southwards, and passing round a sharp curve, carried on a viaduct, crosses the Midland main line close to Engine Shed Junction on the latter, between Wellington and Hunslet.

[Reply to E. E. BURGIS.]

Exeter-Salisbury Timings, S.R.

The Brighton express publicly booked to leave Exeter at 1.10 p.m. has a working departure at 1.12 p.m., and is scheduled to pass Sidmouth Junction 1.29, Yeovil Junction 2.9, and Templecombe 2.21. reaching Salisbury at 2.50 p.m. Last year the same train left Exeter at 1.17 p.m. and reached Salisbury at 2.54 p.m., the difference of one minute being picked up between Sidmouth and Yeovil Junctions.

[Reply to J. L. G. MAINDOE.]

L.M.S. 2-6-0 Locomotives.

In course of time the standard 2-6-0 locomotives of the L.M.S. will doubtless be used over the Furness Section, but for the present we believe there are questions of axle-loading over certain viaducts which make their use undesirable. Your other query raises questions of such magnitude that we fear it is impossible to reply to it within the compass of these answers; neither are the data that you require readily obtainable.

[Reply to FRED DIXON.]

The Steam Brake on Locomotives.

It is probably because the steam brake offers greater braking power, especially in proportion to the quantity of steam required for its application, than the vacuum or compressed air brakes, that its use is preferred on locomotives by certain railways. We have no data available in regard to comparing the performance of the two locomotive types mentioned by you.

[Reply to "YORKSHIREMAN."]

Locomotive Superintendents.

We regret that we cannot give exact details of the locomotive superintendents who held office on the Scottish Central and Scottish North-Eastern Railways until 1865. Those of the Caledonian were J. Sinclair, B. Connor and J. Smellie prior to J. F. McIntosh.

[Reply to "BALORNOCK."]

Whereabouts of Locomotives.

We cannot answer inquiries as to the whereabouts of particular engines in that, firstly, it would be necessary to institute special inquiries, and, secondly, as often as not the engine would have been shifted or perhaps have gone into the shops before the reply could be published.

[Reply to "FLYING FOX."]

High Pressure "Royal Scot" Locomotive.

As soon as this engine is in service and has run its preliminary trials, we shall, of course, illustrate and describe it. We have no knowledge yet as to when this will be. Un-rebuilt Horwich 4-6-0's have either been or are to be scrapped.

[Reply to "THE 12.45 P.M."]

Bristol (Temple Meads) Station.

The passenger station at Temple Meads, Bristol, is the joint property of the Great Western and London Midland and Scottish (late Midland) Railways.

[Reply to "HAZELWOOD."]

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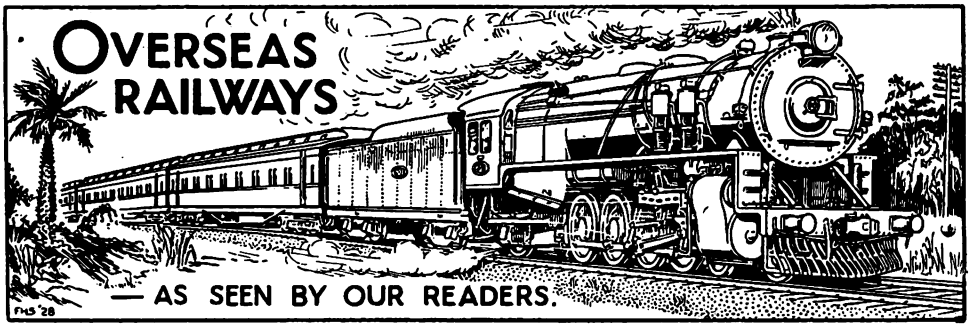

Correspondence for this section, with or without photographs, is invited.

The "Rheingold" Express.

DURING a visit to Germany last August I made a point of visiting several of the stations at which this famous express stopped. At Mainz, for example, the southbound train arrived at 14.00; the northbound train departed at 14.29. In each case the stop was only of two minutes' duration. Every time I saw this train it was up to time. Considering that the distance between the Hook of Holland and Basel is some five hundred miles, great credit is due to organisation. At Cologne, however, the allowance was six minutes. "I wonder if, in this country, there is any important express train which stops only two minutes at intermediate stations."—[GEORGE S. DUNCAN.]

A Long Roundabout Journey in U.S.A.

A FEW particulars of a recent roundabout journey from New York to Los Angeles may be of interest to your readers. I left New York by the New York Central on the *Iroquois*, which is timed to cover the 955.7 miles to Chicago in 21 hours 10 minutes. We left the Grand Central Terminal at 11.20 p.m. behind an electric engine, the load being twelve cars. I retired at once to bed and, on waking up next morning and looking out of my window, found we were passing mile post 416.3 at 8.05½ a.m. This indicated that we were running a bit late, but speed ruled high, and after I had made my toilet I noted we were passing mile post 434.3 at 8.22¼ a.m., having run the last 18 miles in 16¾ minutes. We arrived at the new station in Buffalo, recently described in THE RAILWAY MAGAZINE, at 8.27 a.m., or nine minutes late. From New York we had covered the 435.9 miles in 9 hours 7 minutes with four intermediate stops. This is at least as good as the Flying Scotsman or Royal Scot to Edinburgh.

Owing to heavy marshalling work in Buffalo, we did not get away till 8.51½ a.m., or 21½ minutes late. But we were now on the Michigan Central Railroad, famous for its high speeds. The day was very overcast, with strong rain squalls, but No. 8205, one of the 4-6-4 Hudson class, took hold of the eleven steel cars in fine style, and after leaving Bridgeburg we began to move. Mile after mile was covered at 65 to 70 miles per hour. From passing Welland to arriving at St. Thomas we ran the 100.9 miles in 91½ minutes, and, after a stop of 5¼ minutes at St. Thomas, we ran nonstop to Windsor in 102 minutes for the 109.8 miles. A stretch of 228 miles, which is about equal to London to Plymouth, took only 214¼ minutes net, the booked time being 246 minutes.

From Windsor our train was hauled through the tunnel by an electric engine, and we soon entered the large and modern station of Detroit. Onward to Chicago the run was uneventful, as the timing of 6 hours 55 minutes for the 283.5 miles is fairly easy, even though nine stops are scheduled. We actually arrived in Chicago at 7.25 p.m., or 5 minutes early. A short taxi-cab ride brought me to the very fine new Union Station, which is in some respects not unlike the Grand Central Terminal in New York. There are about 25 tracks for passenger traffic. Here I joined the new Great Northern Railway train known as the "Empire Builder," and, although I have now travelled more than 300,000 miles on American and Canadian railroads, I have never been on such a magnificent train. The rolling stock is the very latest thing, and an adequate description would need a small pamphlet.

Suffice it to say that the observation car is entirely given over to public purposes instead of about 50 per cent. of its space being devoted to sections or state-rooms. It contains a radio, which blared forth from early morn to late night, and, indeed, constitutes my only criticism of the train. The sleeping cars are of the latest 8 section, 2 compartment, 1 drawing-room type,

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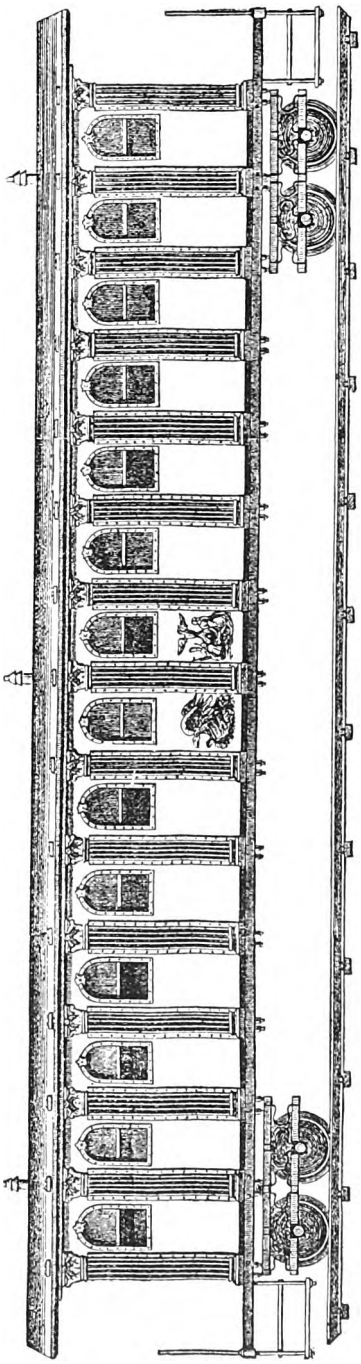
with headboards dividing the sections by day. Interior decoration in restful green and a special lighting system add to the charm and comfort of the cars, all of which are named after persons famous in the early development of the Great Northern Railway and North Western Country. Of the excellent food and service in the dining car it is impossible to speak too highly, and the moderate prices and great variety of the menu is remarkable.



AN EARLY AMERICAN PULLMAN CAR, SHOWING ALSO ELABORATE DECORATIONS.

We pulled out of the Union Station, Chicago, at 9.03 p.m. The public time is 9 p.m., but the "Empire Builder" waits for three minutes to allow the North Coast Limited to precede it over the same tracks to St. Paul, to which point (431 miles) both trains are hauled over the lines of the Chicago, Burlington & Quincy Railroad.

Our engine was 2927, of the 4-6-2 type. The journey from Chicago to Seattle covers 2,196 miles, and may be described as being through woods and lakes for about 900 miles, gradually changing to hundreds of miles of prairie, and then to wonderful mountain scenery for the last 700 miles. For about 60 miles the line traverses the famous Glacier National Park. In several places the Canadian border is only a short distance to the north.

Our long run was comparatively uneventful, except that a freight wreck in the mountains delayed us for about 1¾ hours, but, true to American tradition, this time was all recovered, notably between Troy and Spokane, when the 140 miles were covered nonstop in 3 hours 33 minutes, or 57 minutes inside schedule. Our engines were mostly of the huge 2500 4-8-2 class, with 12-wheel tenders. Load throughout was 11 to 12 steel 12-wheel cars. I arrived in Seattle at 9.59 a.m., or one minute early, after a thoroughly enjoyable journey. The 2,196 miles from Chicago had been covered in 62 hours 56 minutes.

There is no extra fare on *The Empire Builder*. From Seattle to Portland the traffic is pooled by the four railroads. I used the Great Northern 4.30 p.m. express, and arrived at Portland, 177.7 miles, at 9.45 p.m., exactly on time.

At Portland I paid $3.00 extra fare and joined the Southern Pacific "Cascade Limited," which leaves at 10.15 p.m. and runs to Oakland Pier in 21 hours 25 minutes for the 718 miles, via the new Klamath Falls route. Even allowing for many curves and some heavy grades, this time is, in my opinion, unduly liberal. We were hauled by No. 4349, a huge 4-8-2, with 12-wheel tender, and had a heavy load of 13 cars. No. 4349 was still on the train at Dunsmuir at 10.30 next morning. I am not sure where it was finally detached. The run was without incident, and we arrived at Oakland Pier at 7.36 p.m. next day, or 4 minutes early. The stretch of 95 miles from Tehama to Yolo, nonstop over single track, which we covered in 114 minutes, may be specially

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mentioned. The weather was gloriously fine, and perfect views of 12,000-foot Mount Shasta were enjoyed for miles.

After one hour at Oakland Pier my through Portland sleeper was attached to "The Padre," which left at 8.45 p.m., and ran to Los Angeles via the Coast Line, arriving at 9.50 next morning, or 5 minutes late (471 miles). Thus ended for me one more trip across the American Continent, during which I had covered 4,518 miles under almost perfect conditions.—[ERIC CRICKMAY.]

Railways in the South of France.

MY principal travels, where I could make close observations, were on those routes of the Chemin de Fer du Midi, which are still operated by steam. I was much handicapped by the fact that I had to stay most of the time at a small place in the Cevennes Mountains, 18 miles from a station. But that station, Le Vigan, in the department of Gard, marks an end-on junction of the Midi and P.L.M. railways. Le Vigan is best reached from Paris as follows. The famous series of long-distance expresses leaving the Gare de Lyon at Paris includes one at 8.40 p.m., which has sleeping cars right through to the Spanish frontier on the Mediterranean between Cerbere and Port Bon. On the whole it is no slower than the others, except for extra stops at Macen, Vienne, Montélimar, &c. Nîmes is reached at 8.37 next morning, where it is necessary to change, and the 58 miles from Nîmes to Le Vigan is then accomplished in three hours. This P.L.M. branch line is operated chiefly by large 4-8-0 engines of the 240A class. A few 2-8-0's are also to be seen on goods traffic. Some of the adjacent branches (from Sernmières to Montpellier, for example) are worked by 4-4-0's of an old design. The whole line is single except at stations, and presents immense difficulties of gradients, tunnels and curves in its passage among the lower Cevennes. The passenger coaches are all six-wheeled, though some have corridors.

The Midi Railway continues this route from Le Vigan for 38½ miles in a westerly direction. Le Vigan is a through station with long platforms and spacious goods yard ; also separate sheds for P.L.M. and Midi locomotives, but the passenger trains do not work through. There are only four P.L.M. trains each way. The Midi have rather more, but some of these only make short journeys or are third-class only. About three each way proceed the whole 38 miles to Tournemine-Roquefort, where a junction is made with the Midi route running north and south from Neussargues to Beziers. These trains are usually worked by small 4-6-0 locomotives built by Schneider, of Creusot, about 1899-1903.

The route from Tournemine to Beziers is interesting. It has much more traffic than those at Le Vigan, of course, but it is equally difficult, and all trains must be piloted between Tournemine and Bedarieux, an important junction. I have not visited the northern extremity of this route, but apparently at Neussargues it makes connection with the Orleans Railway. Moreover, it also has a junction with the P.L.M. Railway at St. Honri. Through P.L.M. coaches, in which I travelled between Tournemine and Bedarieux, are operated twice each way daily between Paris and Beziers, *via* Clermont-Ferrand, and this route. They are eight-wheeled corridor stock. The principal locomotives in this district are two large and powerful types of tank, the 4-8-0T and the 0-10-0T, the latter being numbered 5041 and so on. These are assisted by a very numerous class of 0-6-0 tender engines, all very old, and still more archaic looking than the corresponding P.L.M. type, most apparently built about 1869-73. The piloting causes curious combinations. I saw a through train for Paris at Tournemine drawn by a 4-8-0T with 0-6-0 piloting, and then saw a southward goods train of only 23 wagons leave behind two 0-10-0T's.

The branches from Bedarieux, like those from Tournemine, are worked by the small type of 4-6-0 tender, which is presumably suitable for fairly long and difficult branch work. On the first trip on the Midi my destination was St. Pins, on the Bedarieux-Castres branch. Four-wheeled stock is more common than six-wheeled on many of these routes, and it was universal between Tournemine and Le Vigan. On my return I rejoined the same route at Bedarieux, having travelled from Carcassonne *via* Narbonne and Beziers.. Between Carcassonne and Narbonne I again travelled on a through train from Paris to the Spanish border for Barcelona. But on this occasion it had used the Paris-Orleans route, and was composed of the latter company's eight-wheeled and six-wheeled stock. The competing trains are united at Narbonne. The Orleans train is seventeen minutes the quicker, but their route is 23 miles shorter, not much in it. P.L.M., 562 miles in 15 hr. 2 min. Paris to Narbonne P.O., 539 miles in 14 hr. 45 min. (7 hr. 20 min. allowed from Narbonne to Barcelona, combined train). There is also a much faster train this season specially for the Exhibition, operated entirely with International Sleeping Car stock by the Orleans Company's route and allowed 12 hr. 22 min.

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from Paris to Narbonne, and 17 hr. 55 min. to Barcelona.

On the routes round Carcassone and Narbonne I found a large class of 4-6-0 with an occasional Pacific on the principal trains. One of the 4-6-0's ran very well between Carcassonne and Narbonne with a heavy load on the ordinary "Barcelona" express mentioned above. On goods and other general traffic the small 4-6-0's and 0-6-0's are again very numerous, and there are also some 0-8-0's which look as old as the 0-6-0's. On the other hand, there are some fine 2-8-0's on goods work, which, I believe, were built in America during the War. The same three types mentioned before also work the long branch among the foothills of the Pyrenees from Carcassonne to Quillan, Axat, and Perpignan, and appeared to perform goods work on the new Trans-Pyrenean railway from Aix-les-Thermes to Puigcerda, of which I was able to see something within a month of its opening. Unfortunately, south of Carcassonne I was always being driven by car, so could not actually travel on any of these fascinating routes.

You mention the new line in the September MAGAZINE. The former metre gauge line has been extended from Bourg Madame to La Tour de Corol to meet it. The latter route is equipped with centre-rail, and is operated by yellow electric stock, but the new route has the overhead wire and blue rolling stock. The presence of three gauges so near together at La Tour must look very curious, but I had no time to inspect the place closely. There is a general air of newness about the whole route. Tip wagons are still lying about, and small tank engines of contractor's type are still in service. The July Continental Bradshaw, which is the only summer issue available, gave it very scant recognition, merely mentioning the times of a few trains which would work beyond Ax when the route was opened, and not showing the route at all on the map. The road over the Puymorens Pass reaches 7,000 feet, while the railway below is 5,200 feet. I do not know the altitude of the railway in the tunnel between La Tour and Puigcerda. Many of the smaller tunnels and works have been practically complete for many years, according to the dates on them. A new road into Andorra starts near L'Hospitalet station. The latter is called "L'Hospitalet pour Andorre." The route is single except at stations, even in apparently the most important tunnels. Actually a considerable passenger and goods traffic is already operated, and the route must have been valuable for Exhibition traffic for Barcelona.

I have noticed that considerable interest is shown in French steam tramways. There is one northwards from Carcassonne for about ten miles to Lastours, of standard gauge, though I could find no physical connection between this and the Midi Railway. Lastours possesses a famous castle, and passenger trains are provided for tourists and local residents. These are composed of two or three cars of tramway open type, one being fitted with a De Dion Bouton internal combustion engine, which supplies the motive power. But the tramway is built chiefly to serve arsenic mines. The mineral wagons are shunted by horses, and then drawn by 0-6-0 tank engines with two domes.

Mazamet and the district is a centre for wool traffic. The raw wool is brought by rail from the ship's side at Marseilles or Bordeaux at cheap rates, then subjected to various processes in factories and warehouses, and then sent to England or Northern France to be made up into cloth, at least so I was informed.

My return journey from Le Vigan to England (September 9-10) was not without interesting features. I may say that the P.L.M. Railway presents at least one very curious feature to the student of locomotive types. In England 2-6-0 tender engines, and 0-6-2 tank engines, are very common. On the P.L.M. I saw frequently both 2-6-0 tanks and 0-6-2 tenders. Darkness and my ignorance of the route spoilt my chances of recording the work of the P.L.M. 4-8-2's. But I was able to record the bare details of the last part of my journey from Laroche to Paris. I had joined the train (through from Narbonne to Paris) at Nîmes. Near Avignon the derailment of a previous train caused a half-hour wait, and the lateness increased as the journey proceeded. The train eventually left Laroche, 96¼ miles from Paris, at exactly 7.30 a.m., 1 hr. 10 min. late. The train was due at Paris at 8.45 a.m., and I hoped to catch the 10 a.m. boat express to Calais at Paris (Nord). I feared this would now be impossible. Fortunately the schedule is very sluggish, 2 hr. 25 min. for 96¼ miles non-stop. Actually No. 231 D43, 4-6-2, took only 1 hr. 55 min., with one dead stop a mile from the terminus, arriving only 40 min. late at 9.25 a.m., having regained half an hour with ten large eight-wheelers and a four-wheeler, which I estimated at 350 tons. I thus safely caught the 10 a.m. from Paris (Nord) to Calais.

I omitted to state that the large 4-8-0 and 0-10-0 Midi tanks had been built by the Société Alsacienne, of Belfort, about 1913. The old 0-6-0's were the products of various makers.—["STAFFORDSHIRE KNOT."]

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Views in India and Ceylon.

THE photographs on pages 64 and 65 afford an interesting contrast between South India and Ceylon. Coonoor Station, on the Nilgiri Mountain line of the South Indian Railway, is located some 5,600 feet above sea level, and the illustration shows in the background a number of the tea gardens for which the district is famous. The photograph was taken from a slowly-moving train as we left the rack section (Abt system), which extends from Kallar (1,250 ft. high), the ruling gradient being 1 in 12, while there are considerable lengths of 1 in 12½. The Nilgiri Mountain Railway, which extends from Mettupalaiyam to Ootacamund, one of the famous Indian hill stations, a distance of 28½ miles, is on the metre gauge, and is located in very treacherous country. It is one of the most spectacular pieces of railway construction I have seen, the line hugging the mountain side throughout the whole climb to Coonoor. The difficult nature of the country can perhaps be measured by the fact that it takes as long to negotiate the 29 miles as it does to travel the 187 miles between London and Manchester by L.M.S. express. During the monsoon periods landslides are not infrequent, and two days after my visit two bridges were washed away, and the train service had consequently to be suspended for some time.

Slave Island, Ceylon Government Railway, from the footbridge of which the second photograph was taken at an early hour of the morning, is an important station for suburban traffic in the Colombo area. The photograph is interesting as showing, on the level crossing, bullock carts and rickshaws, both of which are extensively used in Ceylon and India. This station is located on the double-track coast line, which extends as far as Morotuwa, and especially beyond Mount Lavinia affords magnificent scenic views. The stations on the line are clean and well equipped, and have name-boards located at right angles to the platform, and all printed in English, Tamil and Singhalese. The Ceylon Government Railway is mainly on the 5-ft. 6-in. gauge, and connects with the South Indian Railway by means of a ferry service operated by the latter administration between Dhanushkodi and Talaimannar.—[C. TRAVIS.]

Swiss Railway Matters.

THOUGH not wishing to take up an antagonistic attitude, I should like to correct some of Mr. Underwood's remarks which appeared in your November issue. The Chambéry-Modane section of the P.L.M., now in course of electrification, is *not* being altered from the third-rail to the overhead system. I have it on the authority of the engineer in charge of the electrification, besides that of a recent cutting from a local newspaper of the district, that the overhead equipment is only to be used in the more important stations, viz., those mentioned by Mr. Underwood, as it is safer and better suited for shunting; elsewhere, the third-rail will be employed, as being cheaper and easier to install. As a matter of fact, I also travelled to Turin and back by this route last May, and the third-rail was then laid from Chambéry as far as St. Jean-de-Maurienne, though I did notice that between there and St. Michel the third-rail appeared to have been taken up, temporarily, in places.

Between Chambéry and St. Jean-de-Maurienne the electrification is now finished, and the engineers say that by the end of the year there will no longer be a single steam engine in service between Chambéry and Modane. I think it is doubtful whether the Culoz-Chambéry section will be electrified just yet; for some time the P.L.M. has had the idea of electrifying the line from Culoz to Genero.

Chambéry now possesses what is termed to be the most powerful single-unit electric locomotive in the world. It is of the 4-6-6-4 type, developing 5,400 horse-power, by means of six motors of about 900 H.P. each. This locomotive is the joint production of the Société Oerlikon, of Paris (electrical equipment), the Société des Batignolles (mechanical equipment), and the Compagnie Générale, of Nantes (the assembling), and is capable of a speed of 130 km. per hour with a full load, though the speed limit on this section is 110 km. per hour. The P.L.M. has two more engines of this type on order. When trains become electrically hauled between Chambéry and the Franco-Italian frontier, the present time for the journey (as well as the dirt) will be materially decreased.—[J. C. MERTENS.]

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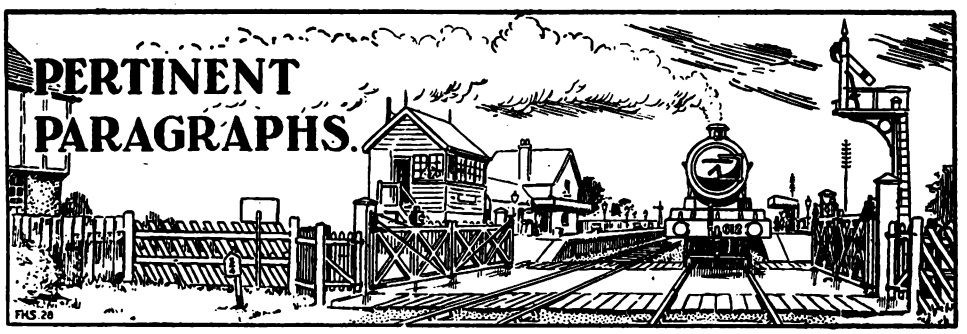

Railway Bills in Parliament.

An unusual feature of the Bills and Provisional Orders to be promoted by British railway companies for the forthcoming session is that there are four instances of proposals for definite extensions, apart from widenings and other improvements. One of these is the Southern Railway's project for a new railway of between 7 and 8 miles in length, with three new stations, starting from a point south of Motspur Park station on the Wimbledon-Epsom-Leatherhead line and rejoining that line between Ashtead and Leatherhead. This will open up an attractive district at present unprovided with railway facilities. There is a scheme for the extension of the Piccadilly Tube for 7½ miles from Finsbury Park northwards to Cockfosters, a mile north of East Barnet, on which there are to be seven stations. The London Midland & Scottish is proposing a new line of about 4⅛ miles in length, which will give a direct connection between the Tottenham and Forest Gate line and the Victoria and Albert docks at Custom House station. The Metropolitan is planning a new line of four miles from Preston Road station to Stanmore.

Great Western Railway schemes include a large number of improvements, comprising a better alignment at Westbury and at Frome, and widenings and deviations in the neighbourhood of Taunton, which will all facilitate the running of trains to and from the West. In South Wales there is to be a new entrance lock from the River Tawe to the King's Dock at Swansea, and new connections between the main line and the Taff Vale section. Two subways are proposed at Paddington: under Bishop's Road and a new access to the "Underground" station. Many bridge lengthenings and widenings are planned. The company wishes to acquire the Corris Railway of 11 miles on the 2-ft. 3-in. gauge, which has a station adjoining that of the Cambrian Section at Machynlleth. At the same time various abandonments are proposed, viz., of part of the Burry Port & Gwendreath Railway, part of the Wheatsheaf branch near Wrexham, part of the Gwersyllt Colliery branch, and the Frwd branch.

A very extensive programme of improvements is foreshadowed in the notices of the London & North Eastern Railway Bill and Scottish Provisional Order. In the London area there is to be a widening between Romford and Shenfield and Hutton, and on the route between London and Doncaster via March three new passing loops are to be provided, *i.e.*, between Ely and Blackbank, at Pinchbeck near Spalding and at Saxilby near Lincoln. New railways are projected at Chelmsford and Ipswich, and new connections between the Hull & Barnsley and North Eastern sections at Drax and Eastrington. There is to be a widening of the Sheffield-Manchester line at Dinting, and traffic on the East Coast route will be much facilitated by the proposed doubling of the line between Montrose and Lunan Bay.

Apart from its new railway the London Midland & Scottish has plans for widening the Birmingham and Bristol line as between Bromsgrove and the junction with the Great Western's Stoke Priors branch; another widening is for about 2 miles on the Trent-Derby line as between Draycott and Borrowash.

Among the most important of the Southern Railway's proposed new works is the improvement of the City station of the Waterloo & City Railway by the provision of escalators and a new subway. Other works include a widening of the Hounslow loop line in Heston and Isleworth.

Another Metropolitan work is a railway at Wembley Park station connecting with an authorised widening and the up through slow line of the Aylesbury extension.

In addition to the tube extension the "Underground" Railways propose widenings of the District Railway's Hounslow Extension, deviations of the Piccadilly Tube in the neighbourhood of Down Street and Hyde Park Corner and the provision of

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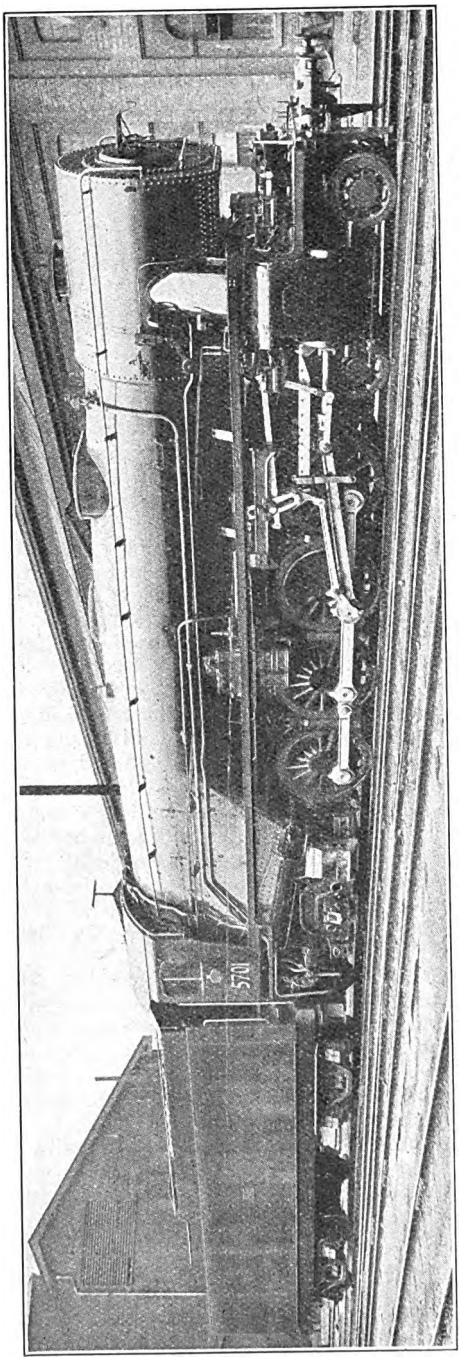
new booking-halls under the Green Park near Devonshire House, at Hyde Park Corner, Knightsbridge, King's Cross, Warren Street, Edgware Road, Russell Square and Marble Arch, and subways in connection therewith, and also at Kentish Town, Chancery Lane, Holborn and King William Street, City.



Additional capital powers will be sought by the London & North Eastern, Metropolitan, Southern and "Underground" Railways. Five companies are asking for further powers for dealing with hackney carriages in the London area, and the London & North Eastern, London Midland & Scottish, and Southern propose a continuance of their present dock-charging powers beyond October 1, 1930.

The Largest Australian-Built Locomotive in Operation.

RECENTLY, the first of the twenty-five 4-8-2 type locomotives which are being built by the Clyde Engineering Works in Sydney to the order of the New South Wales Government, was completed. This type of locomotive, known as the "D 57 Class," is the largest to be built in Australia, the total cost of the locomotives being £520,375. Prior to the introduction of this type of locomotive, the largest Australian-built locomotive was the "S 300" Pacific engine of the Victorian Railways, which weighs 190 tons in working order, including the tender. At present the new "D 57 Class" will be confined to hauling heavy goods trains over the sections between Sydney, Lithgow and Kiama in New South Wales.

Gauge	.. .. ..	4 ft. 8½ in.
Class	.. .. ..	D 57.
Cylinders (3).	Diameter ..	23¼ in.
,,	Stroke ..	28 in.
Grate Area	.. .. ..	65 sq. ft.
Boiler Pressure	.. ..	200 lb. per sq. in.
Driving Wheels.	diam.	5 ft.
Heating Surface :—		
Firebox and C.C.	..	259 sq. ft.
Tubes and Flues	..	3,094 ,,
Arch Tubes	.. ..	37 ,,
Superheater	.. ..	773 ,,
Total	.. ..	4,163
Total Weight of Engine	..	135 tons.
Engine Wheel Base	..	37 ft. 7½ in.
Length over Buffer	..	86 ft. 11¾ in.
Tender Capacity, Coal	..	14 tons.
,, ,, Water	..	9,000 gallons.
Tractive effort at 75 per cent. Cut Off	.. ..	56,000 lb.
Total Weight of Engine and Tender in Working Order		230 tons.

Notes on Irish Railways.

COMMENTING upon remarks in the October number, Mr. John L. Spencer Smith, writing from Belfast, mentions that No. 68, N.C.C., was originally Class A, 4-4-0 compound. This class included Nos.

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34, 62, 64, 65 and 68, all now rebuilt as two-cylinder simple engines and fitted with superheater boilers. The diameter of the coupled wheels is 6 ft., and the cylinders are now 18 in. × 24 in. The Class C 2-4-0 compounds, Nos. 21, 24 and 28, have been rebuilt similarly, and now constitute Class B3, the 4-4-0 engines previously mentioned being Class A1. The G.N.R. (I.) recently reboilered one or two of the "170" class 4-4-0's, with boilers pressed to 200 lb. per sq. in., as against the former 175 lb. This has proved successful in working economies, and the whole class of eight has now been reboilered, viz., Nos. 170-4 and 190-2. These locomotives work the Belfast-Dublin expresses, which, although usually of a light character (200-250 tons), are closely timed. The 5.30 p.m. Belfast-Dublin takes 30 mins. for the 25 miles to Portadown; 40 mins. over the 33¼ miles to Dundalk, including a slowing for the Warrenpoint slip at Goraghwood, just before the ascent to Goraghwood summit; 28 mins. to Drogheda, 22½ miles, which includes a climb of 7½ miles at 1 in 195, and, finally, the 31¾ miles to Dundalk in 38 minutes. The G.N.R. have recently ordered five 4-4-2T locomotives from Beyer, Peacock & Co. Ltd. to replace five Class A 0-6-0 locomotives to be scrapped.

Emergency Traffic Working, L.N.E.R

MR. R. A. H. WEIGHT writes:—

"In consequence of the main lines being completely closed owing to a sudden mishap with a girder which was being placed in position in connection with the rebuilding of a road-bridge at Welwyn Garden City, interesting emergency arrangements had to be carried out on the Great Northern section on Sunday, October 20.

"The 8.30 a.m. slow King's Cross to Doncaster was unable to proceed beyond Welwyn Garden City, and the engine (Atlantic 4415) returned, tender first, with her train to King's Cross, running as the 10.39 a.m. arrival. Trainmen and passengers were, however, exchanged by means of walking beyond the bridge and continuing their journey in an up train which was stopped as near as possible to the obstruction, and returned to the North. Similarly, transfer was effected from the original up train to the substituted one, the same plan being adopted later in the morning by reversing the two Hitchin stopping trains. The following down expresses travelled *via* the Enfield-Cuffley-Hertford loop, leaving the fast line at Wood Green South, and, after passing the station on slow line No. 1, running on to the Enfield track by means of the flying junction:—10.0 a.m. King's Cross to Leeds excursion; 10.10 a.m. King's Cross to Cleethorpes excursion; 10.30 a.m. Pullman; 11.30 a.m. Scotch; 11.40 a.m. Newcastle; and 12.0 noon Leeds and Bradford. Also two stopping trains. The milk-empties train to Stafford, &c., was returned from Hatfield to Wood Green. Three up express excursions came from Langley Junction over the same emergency route."

Mineral Transport Committee Report.

THE Standing Committee on Mineral Transport, appointed on February 17, 1927, with Sir Arthur Duckham as Chairman, has issued its first report to the Minister of Transport and the Secretary for Mines. Amongst the 18 members of the committee were four railway representatives, Mr. Robert Bell, Mr. James Milne, Mr. Gilbert S. Szlumper and Mr. Ernest Wharton, while Sir Cyril Hurcomb represented the Minister of Transport. Among the principal recommendations are that definite and immediate steps should be taken to reconstruct the principal loading and unloading terminals which could not accommodate the 20-ton wagon at present. Contingent on such reconstruction being taken in hand at the majority of terminals, the committee is of opinion that after January 1, 1932, no wagons of smaller capacity than 20 tons should be constructed for mineral transport unless permission was given to meet special circumstances. While of opinion that the adoption of a higher scale of demurrage and siding rent charges would undoubtedly result in a quicker clearance of wagons, the committee recommends no change regarding shipment coal. Provision of sales depôts at railway terminals would do much to relieve shunting. It would eliminate a good deal of overhead charges. As to pooling of wagons, it is suggested that it would be possible to fix a date (say January 1, 1932), after which no privately-owned wagons should be allowed to run on public railways unless operated in connection with a recognised pool. The committee recommends that the Railway Rates Tribunal should consider the granting of relatively lower rates for conveyance of coal in large consignments and in high capacity wagons.

A Trip on the Bishop's Castle Railway.

MR. H. P. HART, of Bury St. Edmunds, sends the following notes:—

"The engine was a 0-4-2T bought from the G.W.R. about 30 years ago. The train consisted of two four-wheeled coaches painted red, second and third class—there was no first-class compartment, although on the time sheet the trains are advertised as 1st, 2nd and 3rd—several trucks, and a Bishop's Castle brake-van. The line is

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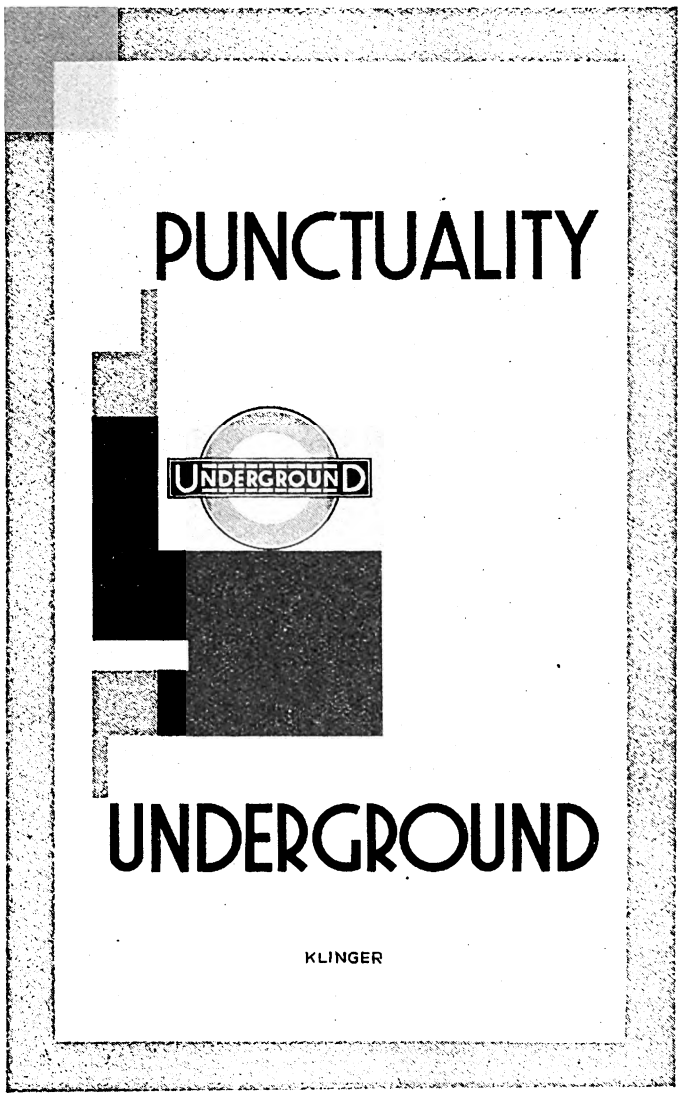
much overgrown, and you could hear the branches of the trees brushing against the train—the track between the rails is very grassy. The signals, which had a very sorry appearance, seemed to be worked by levers at the foot of the post. I noticed that clocks were provided at Horderley and Plowden stations, but they were not going. The stations themselves had a very deserted appearance. At Plowden we put off a truck, which took up a long time. Lydham Heath is a terminus, and the engine has to run round in order to take the train on to Bishop's Castle. Progress was very slow, at no time can the speed have been more than 15 m.p.h. We left Craven Arms at 3.15, and were due at Bishop's Castle at 3.55—the distance is 10½ miles—but we did not arrive until 4.15. There is one other engine—I noticed it at Bishop's Castle. It is an old G.W. 0-6-0 goods engine—it was in a dismantled condition. The whole line has a very dilapidated appearance. How was it that it was not taken over by G.W. and L.M.S. when the grouping took place? The company has been in Chancery for many years. There is an amusing story about it in THE RAILWAY MAGAZINE, vol. iv, 'How a Railway Circumvented the Lawyers.'"



ONE OF TWO INTERESTING POSTERS, "PUNCTUALITY" AND "CONSTANCY," RECENTLY ISSUED BY THE "UNDERGROUND." THE ARTIST IS MR. JULIUS KLINGER.

125 - ton Hot - Metal Wagon.

THE Engineering Department of the Pearson & Knowles Coal & Iron Co., Ltd., of Warrington, has built for the International Construction Co., Ltd., of London, a ladle of very large proportions for the handling of molten metal. This ladle, which is mounted on bogies, and is known as a "Hot-Metal Mixer Car," is intended for the transport of molten metal, and has a capacity of 125 tons. While such mixer cars are to be found in some of the large steel plants in the United States of America, this is the first of its type to be constructed in England.

The object of the ladle is to mix charges of molten metal from the blast furnaces, and to transfer them direct to the steel-refining furnaces. The container itself, which has a rotary movement electrically driven for filling and tipping, has a diameter of 10 ft. 6 in., and a length of 20 ft. It is

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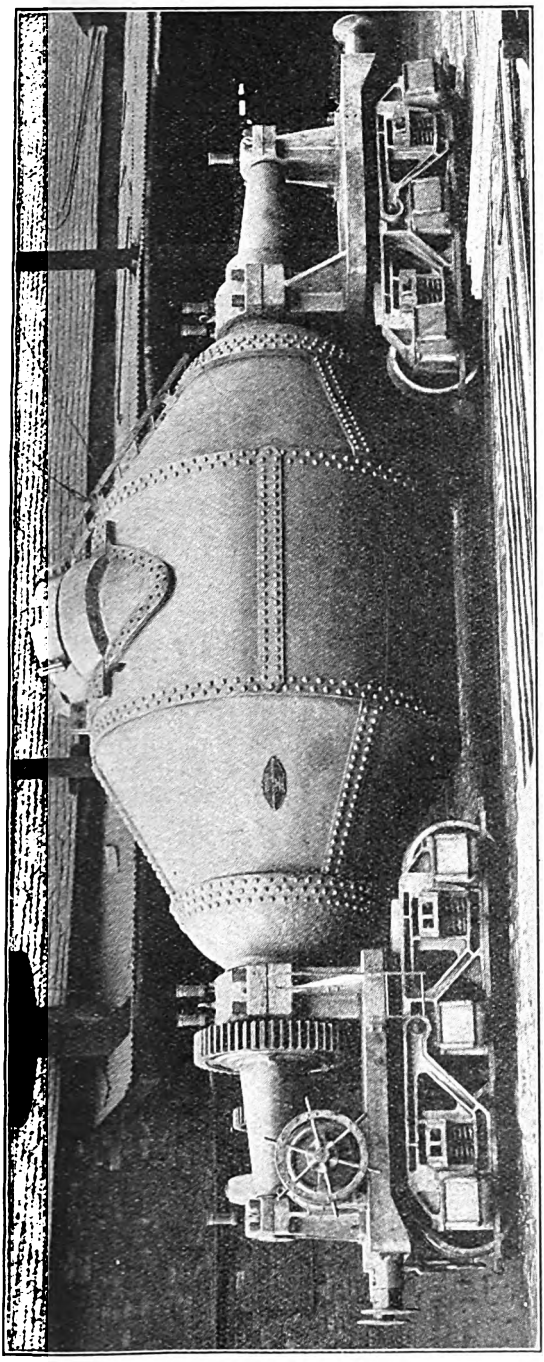
brick lined, and is supported on cast-steel trunnions, the bearings for which are mounted on six-wheeled bogies. When the ladle has received its charge, it is drawn by a locomotive to the refining furnace, where it is tilted by means of the electric motor, which drives through a suitable reduction gearing on to a spur wheel mounted on the trunnions. The overall length of the complete vehicle is about 40 ft., and its total weight is in the neighbourhood of 75 tons.



A SPECIAL CONTAINER CAR FOR STEELWORKS. THE FIRST OF ITS KIND TO BE USED IN ENGLAND.

Owing to the diameter of the ladle being greater than the space available at the platforms of railway stations, special arrangements had to be made with the railway company for its transport from the works of Pearson & Knowles Coal & Iron Co., Ltd., and it was necessary partly to dismantle it in order to accommodate it on special low-loading trucks.

The First Railway Restaurant Cars in England.

Mr. Arthur Towle, Controller, Hotel Services, L.M.S.R., wrote recently to *The Railway Gazette* (a corresponding article appeared in our own pages) as follows:—"My attention has been called to an article headed 'The Jubilee of the Railway Restaurant Car,' which appeared in your issue of November 1, and which would seem to imply that the first Pullman restaurant car in Great Britain commenced on November 1, 1879, between London and Leeds, on the Great Northern Railway. This is not so, as the first Pullman car services were run on the Midland Railway in 1875 between, I believe, Liverpool and London, and as early as January, 1874, the Midland Company were examining the possibility of running Pullman cars, and it was only the necessity of widening one of the tunnels which prevented Pullmans from appearing a year earlier than they did. This service between 1875 and 1883 was added to from time to time until the catering was taken over by the Hotels Department of the Midland Railway and formed the nucleus of the Midland Dining Car Service which is now, of course, part of the restaurant-car service of the L.M.S."

Opening of Chiltern Court Restaurant.

On Friday, November 15, at the invitation of the directors of

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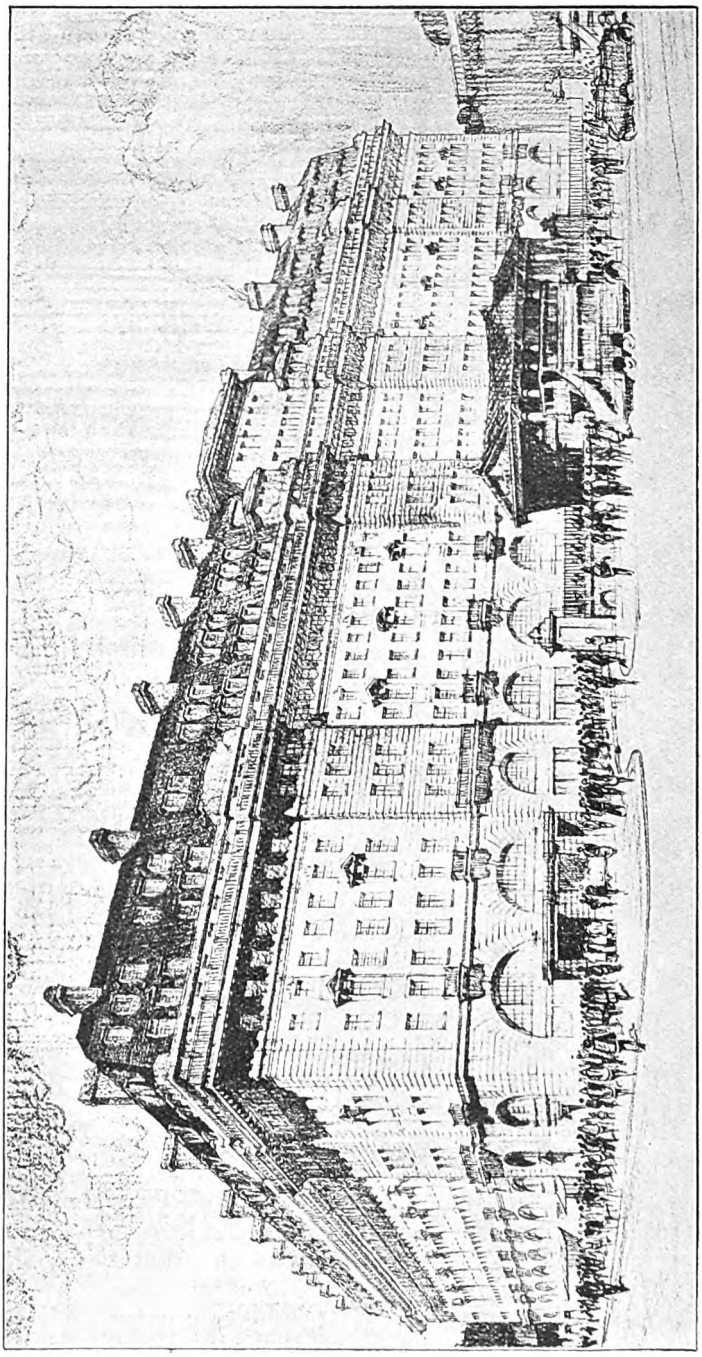
the Metropolitan Railway and Empire Hotels Limited, a number of newspaper representatives met at a luncheon held at the Chiltern Court Restaurant, Baker Street, N.W.1, on the occasion of its opening. Sir Clarendon Hyde, Deputy Chairman, Metropolitan Railway, presided, and in a brief speech of welcome, said it was their hope that in opening such a restaurant they would be supplying a long-felt want in the neighbourhood. Their object was to give a first-rate service and first-rate meals at moderate prices. If, at the conclusion of the repast, anyone present cared to inspect the block of flats above, they were quite at liberty to do so, and arrangements would be made to show them round.



GENERAL VIEW OF CHILTERN COURT, BAKER STREET STATION, METROPOLITAN RAILWAY.

Taking to itself the name of the palatial building of which it forms the central feature, Chiltern Court Restaurant is directly accessible from any part of London, and, although it is convenient for both City and West-End, it is safely removed from noise and disturbing movement. Everything is new and luxurious without being ostentatious. The aim is to have a restaurant where a good dinner is made perfect by a quiet atmosphere of ease and contentment; by furnishings that are chosen with taste and arranged with care.

The restaurant has been carefully decorated to ensure harmony of colour and form, and presents a pleasing sense of elegance and dignity. The ceiling, which is supported by a series of finely-proportioned

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columns, is embellished with the coat-of-arms of the various counties and boroughs through which the Metropolitan Railway passes. The restaurant is fully licensed, and will be open from 7.30 a.m. to 11 p.m. It has a floor space of over 4,000 sq. ft., a seating capacity for 250, and three entrances. Retiring rooms, cloak rooms and telephones are provided, together with a special annexe for patrons desiring more intimate accommodation, a feature which will be appreciated by many.

In connection with the restaurant is Chiltern Hall, which has a floor space of 4,500 sq. ft., and is capable of seating, in full comfort, an audience of over 600. This will be open to the public in the New Year, and will form an important companion feature to the restaurant.

At the conclusion of the luncheon—which fully realised the expectations of those partaking of it—a number of those present availed themselves of the opportunity of inspecting the high-class residential flats known as Chiltern Court—the magnificent pile of buildings whose erection has completely changed the aspect of Baker Street. These comprise 180 suites, ranging from a 10-room mansion flat to a 3-room bachelor flat, a special unit of 30 separate bedrooms for the use of maids, and other attractive features. There can be no doubt that, from the architectural standpoint, Chiltern Court represents one of the finest examples of modern flat construction in London. Its skilful planning assures every convenience and comfort, and its quiet, ordered efficiency is a guarantee of restfulness and contentment. Its easy distance from the City and the shopping centres and West-End theatres speaks for itself, and its nearness to Regent's Park and the golf courses in "Metro-land" is, of course, all in its favour.

The rents of the flats range from £250 to £1,000 per annum—these figures including rates, taxes, heating and water. All have an unrestricted outlook. Special attention has been given to their decoration, and the kitchen arrangements are the last word in labour-saving devices.

The Gibraltar Tunnel.

THE project for a tunnel under the Straits of Gibraltar almost competes in antiquity with the Channel tunnel scheme, but it would appear, from certain preliminary steps recently taken in Spain, to be somewhat nearer to realisation than the latter does at the moment. A scheme brought forward by a Spanish artillery officer, Lieut.-Colonel Jevenois, has been examined by the Spanish Government, who have appointed a committee of experts, including the author of the scheme, to carry out preliminary surveys. The proposal provides for the construction of a tunnel a little over 20 miles in length between Punta Palomas, west of Tarifa, on the Spanish coast, and Ras el Buara, to the east of Tangier, on the northern coast of Africa. The tunnel is estimated to take about six years to build, and to cost approximately £11,000,000. At present, shafts are being sunk and soundings taken along the line of the proposed route. These investigations are expected to occupy at least two years, after which the matter must come before the Spanish Government for decision. The project, of course, has important international implications, both commercial and strategic. It would naturally affect the position of Gibraltar. On the other hand, it is suggested that it would have the greatest influence on international commerce and the development of Africa, including South Africa, although this would necessarily entail the building of transcontinental railways. This, again, would bring into prominence the gauge question, referred to the other day by Mr. Grierson, both in Africa and in Spain. Meanwhile, air routes are fast developing, although we do not suggest that these could take the place of railways. There is no mention of a train ferry as an alternative to a tunnel, although the shortest sea passage is only about nine miles.

Insulated Containers for Perishable Traffic, London Midland & Scottish Railway.

THE introduction by the London Midland & Scottish Railway of fully-insulated containers to cater for meat and other perishable goods traffic marks a further stage in the development of the container form of goods traffic by that company, who were the pioneers in the scheme in this respect about three years ago. The insulated containers, the first batch of which are now in traffic, are distinguished as the "F" type and are 12 ft. long, 6 ft. 2 in. wide and 6 ft. 4 in. high inside measurements, and are constructed of wood painted white outside, the interior being varnished to facilitate cleansing.

The container is fitted with a pair of swing doors opening outward at either side and also with a door at the end, the upper half of which swings outward, the lower half opening in the form of a truck door. Insulation is provided by means of 2 in. of slabbed cork, and this has been found entirely efficient in service. An improve-

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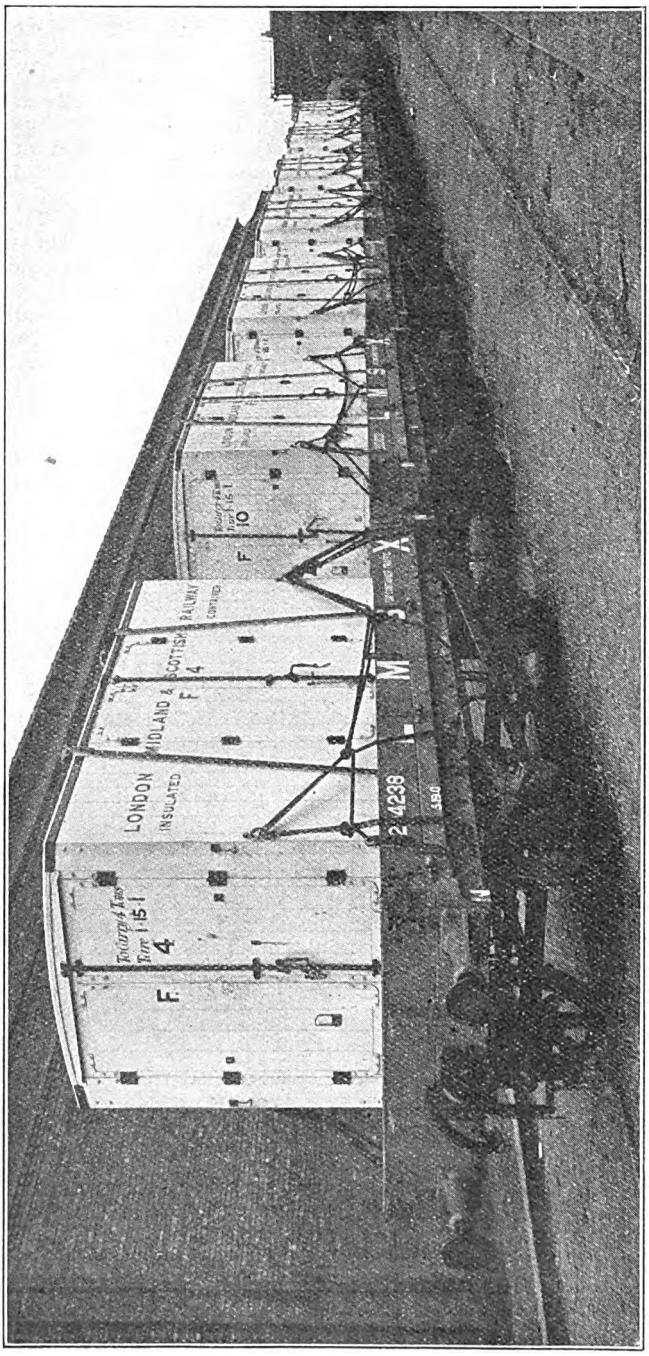
ment, however, will be effected in the next batch of containers to be delivered by having somewhat less insulated material in the floor in order to increase that in the roof upon which the greatest amount of heat from the sun will fall in hot weather.

The containers are rendered securely air-tight by ingenious devices, whereby a spring inserted between the inside wood of the insulated material where the doors occur is employed to force a leather flap tightly into the interstice of the door when closed. Lifting arrangements are provided by slings connected by four lifting chains to the roof and the container, which are designed to carry 4 tons, will weigh empty 35 cwt., and will travel on suitable railway wagons equipped to run on fast goods trains.



INSULATED CONTAINERS FOR PERISHABLE GOODS, L.M.S.R.

Although no hangers are provided for the purpose of handling meat, these containers constitute a considerable improvement upon railway refrigerator cars inasmuch as all handling at stations is eliminated. The meat remains in a cold atmosphere until delivered to shops, store or cold store, and as compared with road transport the rail container facility should be superior in its elimination of bruising. Experts in the meat trade who have had the opportunity of inspecting these containers have been greatly impressed with the improved facilities afforded by their use.

Meldon Viaduct, Southern Railway.

COMMENTING upon the "puzzle picture" on page 345 of the November number (solution given last month), Mr. D. R. Beckett writes:—"To one who has walked underneath the viaduct and examined it closely, there are certain features which are quite unmistakable. For example, the girders under the up-track (left) have no bottom flanges, whereas those under the down track (right) have. Also

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the diagonal bracing of the piers supporting the down track is heavier than that of the piers supporting the up track. It will also be noticed that the piers under the down track have a wider base of support, and partially enclose the piers under the up track. In short, the down half of the viaduct should be somewhat stronger than the up half, and was obviously erected at a different date. I have always assumed that the up and weaker half of the viaduct is the older, and was erected for the purpose of the Holsworthy branch, while the down and stronger half was added when the track was doubled for the purpose of providing a main line to Plymouth. Perhaps you could verify this. The viaduct consists of six spans, and the rails are about 160 ft. above the River West Okement, a typical Dartmoor stream, foaming down its boulder-strewn bed at the bottom of a narrow, steep-sided and picturesque valley, which is well worth a visit from any of your readers who may happen to be in the neighbourhood. The building visible through the piers of the viaduct is one of a group of cottages near Meldon quarries, from which the S.R. obtains most of its ballast for the system, about 150,000 tons being quarried annually. The output is to be largely increased in the near future."

Peebles Branch, L.M.S.R.

MR. C. RUSSELL WOODWARD writes:—"On looking through some back numbers of THE RAILWAY MAGAZINE, I found an article by Mr. H. C. H. Moller on 'The Peebles Branch of the L.M.S.R.' This was exceptionally interesting to me, as I had a fortnight's holiday in Broughton this year, and noted several changes which have taken place since the compiling of the article. Passenger trains are now almost exclusively worked by superheater 4-4-0's of Caledonian origin, one of which is illustrated leaving Broughton, No. 14444 [known as 'four fours']. This type has snifter valves on the boiler saddle; another type working on this line has the snifter behind the chimney, but the two types, though classed '3' and '4' respectively, are practically identical. Goods working is carried out by modern Caledonian 0-6-0's, though occasionally a 'Drummond' 0-6-0 also does freight work.

"All trains contain through coaches for Edinburgh or Glasgow, and are worked through to Carstairs by the same engine. Thus a train may arrive from Carstairs consisting of one coach and a 4-4-0—truly an unusual sight—to join some other nondescript coaches, such as old six-wheelers in their original livery, adorned inside by faded photos of Blackpool and Morecambe! All the Peebles branch locos. are shedded at Carstairs, and the usual working consists of a passenger train to Carlisle, back to Glasgow, and then to Peebles and back to Carstairs—at least I presume this is correct, as more than one driver has affirmed its truth. It should be noted that Broughton Station has several times won prizes for its floral beauties, and, indeed, I have never seen a more beautiful station anywhere."

Underground Railway Improvement Map.

A NEW poster has been issued showing "Underground" improvements between 1914 and 1929. The original shows the new lines in red, stations which are either new or have been reconstructed, equipped with escalators or passimeters, or in other ways improved, being similarly indicated. The result is a striking indication of the tremendous developments during this period of 15 years.

The following list shows the more notable improvements made between 1914 and 1929:—

New Railways opened:—	Miles.
1915. Paddington to Queen's Park ..	$2\frac{1}{4}$
1923 and 1924. Golders Green to Edgware	$5\frac{3}{4}$
1924. Camden Town to Euston ..	
1926. Charing Cross to Kennington ..	$1\frac{1}{2}$
Clapham Common to Morden ..	$5\frac{1}{4}$
A total of nearly 15 miles of new railway	$14\frac{3}{4}$

Reconstructed Railway:—

1924. Euston to Clapham Common, $7\frac{1}{4}$ miles.

Through running over other Companies' Railways:—

1915. Elephant & Castle to Willesden; over L. & N.W.R. from Queen's Park to Willesden.

1917. Elephant & Castle to Watford; over L. & N.W.R. from Queen's Park to Watford.

1920. Liverpool Street to Ealing; over G.W.R. from Wood Lane to Ealing Broadway.

Escalators.

Seventy escalators have been constructed since 1914, thus bringing the total number now in service up to 86.

Stations.

Substantial improvements of various kinds have been carried out at 50 stations owned by the company (not including the new stations on the Edgware, Kennington, and Morden extensions).

Scottish Locomotive Notes.

WE are indebted to Mr. J. R. Sherriffs for the following notes:—"The new standard livery has now been generally adopted, so that all locomotives are now painted black, with the exception of the 'Royal Scots'

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and Midland compounds, which retain the crimson lake colour. The numbers are now painted in large figures on the wings of the cab instead of the tender, which bears merely the letters L.M.S. All the Glasgow 'Royal Scots,' six in number, are stationed at Polmadie, and work south only, with very occasional trips to Edinburgh. The main-line services are largely in the hands of the 'compounds,' although the larger McIntosh and Pickersgill 4-4-0's take their share. Practically all the original Caledonian 4-6-0's are engaged exclusively on goods and mineral trains. So far none of the new 2-6-4 tanks has appeared north of the border. Branch services in the Hamilton and Motherwell area are worked to a considerable extent by Sentinel-Cammell steam cars, which are proving both useful and popular. Older types are gradually disappearing. Very few Drummond 0-4-4 tanks are now to be seen, 15104 having been withdrawn from the Carmyllie branch some months ago. The 4-4-0 tanks (old No. 1 Caledonian class) are entirely engaged on shunting duties; 15021 is at Arbroath; 15025 and 15029 at Glasgow Central; 15027 at Forfar; 15024 is at Perth; and another still retaining Caledonian livery, and numbered 12, is at Glasgow. An old Oban bogie, painted red and numbered 14105, is spare at Dundee West, and another was at Stirling until quite recently. Of the old 0-4-2 tender class, 17002 and 17003 are at Hamilton, the former bearing a St. Rollox plate dated 1879; 17017 is at Dundee, and 17013 works goods on the Balerno branch. A 4-4-0 in Caledonian blue livery (or the remains of it), and numbered 1081, is at Edinburgh, and works certain regular services.

"Most intermediate L.N.E.R. classes, including 'Directors,' are now painted black, but all 'Atlantics,' 'Pacifics' and 'Shires' retain the green livery. Edinburgh and Glasgow suburban services are now largely in the hands of the standard 0-6-2 tanks, which also operate on the Dundee and Arbroath joint line, as well as on several of the Fifeshire branches. N.B. 4-4-2 and 0-4-4 tanks still take a fair share, however. Of the former, 9141, 9452 and 9453 are at Haymarket; 9440 and 9445 are at Dundee. The older classes of 0-4-4 tanks are gradually disappearing, but 9589 works the Methil branch, and 9590 is at Polmont. Reid's 0-4-4's are still all in service: 9349, 9351 and 9352 are at Dundee; 9475 is at Montrose; 9350 and 9353 are at Polmont; while 9354 and 9474 are at St. Margarets. A few of the old 4-4-0 tanks are still in service, and work from Edinburgh. These include 10411 and 10428. Another of the class was seen in process of dismantling outside Cowlairs at the end of November. An old Drummond goods engine, 9572, is to be seen in the Gorgie district of Edinburgh daily, while many of the main-line trains are still piloted by the old 7-ft. 4-4-0's; of these, 9592 is at Haymarket, 9598 at Dundee, and 9595 at Cowlairs. They bear a maker's plate dated 1888, but they were supplied with new domes, safety valves and cabs in 1912. Several of the smaller 4-4-0's are regularly on duty on the G.N.S. section, and take turns with the 4-4-0's of the old Great North on main-line services. 'Pacifics' now work through to Dundee, but so far none has worked beyond that point, except on one occasion when 'Isinglass' went north to Aberdeen for experimental purposes."

Irish Locomotive News.

MR. C. J. COGHLAN writes:—"A new type of standard 0-6-0 goods engines, begun recently at Inchicore, are to bear the Nos. 700-4. The big 4-8-0T No. 900 has been withdrawn from service, and will probably be cut up shortly. Another important withdrawal on the G.S.R. is 4-6-0 No. 400, built in 1916; 0-6-0 saddle tank *Erin* was recently observed in Inchicore awaiting overhaul. One of the old Belfast Central Railway's locomotives is still at work on the G.N.R., and is stabled at Dundalk. Bearing the No. 195 at present, it was formerly No. 96, and is of 4-4-0 side-tank type; it was built by Beyer, Peacock & Co. in 1880, and was rebuilt at Dundalk Works in April, 1904. Recently one of the former C.B. & S.C. Railway's 4-6-0 tanks, viz., No. 468, was sent to Bray Shed for working Westland Row trains."

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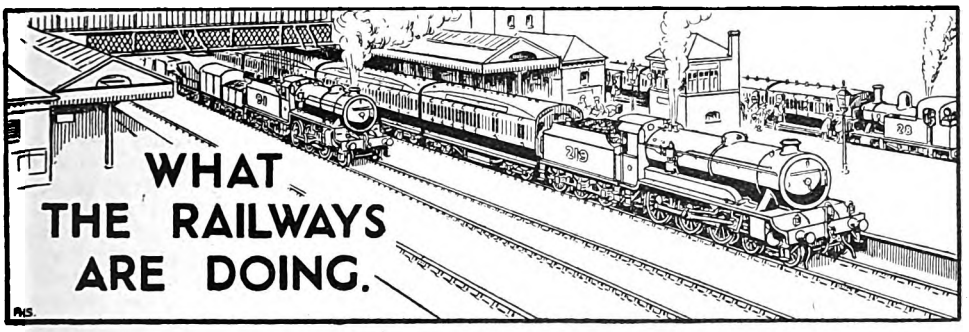

L.M.S.R. APPOINTMENTS.

The following appointments have been authorised:—

Chief General Superintendent's Department.

Mr. A. Foster, of the General Superintendent's Office (Passenger Commercial), Derby, to be Assistant to Advertising and Publicity Officer, P.C.S.O., Euston, *vice* Mr. F. Hare, retiring.

Mr. J. H. Robinson, of Crewe, to be Assistant Divisional Passenger Commercial Superintendent, Manchester, *vice* Mr. N. Brough, retiring.

Mr. H. D. Holmes to be Stationmaster, Walsall, *vice* Mr. J. Jones, retiring.

Mr. F. D. Moulang, of Buxton, to be District Locomotive Superintendent, Wellingborough, *vice* Mr. A. E. Bolderston, retiring.

Mr. J. Briggs, of Worcester, to be District Locomotive Superintendent, Buxton.

Mr. W. A. Fish is appointed District Locomotive Superintendent, Gloucester.

Mr. A. P. Hunter, of Gloucester, to be District Controller, Wellingborough, *vice* Mr. G. Wright, retiring.

Mr. D. Mathieson, of the C.G.S.O., Derby, to be Stationmaster, Bedford, *vice* Mr. D. Lewis, retiring.

Mr. G. Cole, of Bristol, to be District Controller, Gloucester.

Chief Goods Manager's Department.

Mr. W. A. Rouch to be Goods Agent, Victoria Docks.

Mr. S. G. Spiller to be Goods Agent, Bristol, *vice* Mr. D. H. Thistlethwaite, retired.

Mr. M. Allen, of Maidstone, to be District Traffic Agent, York, *vice* Mr. T. C. Roberts, retiring.

Chief Mechanical Engineer's Department.

Mr. F. D. Earl to be Divisional Assistant, Outdoor Machinery Services, Crewe.

* * *

MR. A. FOSTER,

Appointed Assistant to Advertising and Publicity Officer, P.C.S.O., Euston, L.M.S.R.

MR. A. FOSTER, who has been appointed Assistant to Advertising and Publicity Officer, P.C.S.O., Euston, L.M.S.R., as from January 1, 1930, entered L.N.W.R. service in July, 1895, in the General Manager's Department. In 1901, after a probationary period in the Goods Department at Camden, he was transferred to the District Superintendent's Office at Euston as Claims Clerk. In 1903 he went to the office of the Superintendent of the Line, first as general Correspondence Clerk and later as Claims Clerk. He remained in that department until 1919, when he was appointed Chief Claims Clerk (Traffic Department) for the whole of the L.N.W.R., incidentally being responsible for the organisation of a centralised office at Euston. In 1925 he was appointed Chief Claims Clerk (Passenger Department) for the L.M.S.R., and in this connection organised a centralised office at Derby to deal with all claims in the area south of Carlisle, with supervision of the Scottish Area, this office dealing also with claims for personal injury,

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matters connected with lost property, and the supervision of the unclaimed property depots. During this period, Mr. Foster was a member of the Joint Claims Committee of the Associated Railway Companies at the Railway Clearing House, and twice held office as Chairman of that Committee. He was also a lay representative for the railway companies on the Terms and Conditions Committee during the negotiations between the railway companies and the traders in connection with the Standardisation of Terms and Conditions of Carriage by Railway arising out of the Railways Act, 1921, and gave evidence before the Rates Tribunal on the companies' behalf.

* * *

GREAT WESTERN RAILWAY APPOINTMENTS.

The following appointments are announced:—

Mr. S. B. Collett, Solicitor's Department, to be Assistant Secretary, as from November 25.

Mr. J. L. Edwards, Chief Accountant's Office, Paddington, to be Chief Clerk, Secretary's Office, as from November 25.

Mr. N. R. Murray, Chief Accountant's Office, to be Assistant to Chief Accountant, Paddington.

Mr. J. Kelynack, Assistant Chief Clerk for Accounts and Statistics, Swindon, to be Chief Clerk, Chief Mechanical Engineer's Office, Swindon, *vice* Mr. A. J. L. White, deceased.

Mr. F. C. E. Hockridge, Secretary's Office, to be Assistant to the Surveyor.

Mr. A. J. Insall, Superintendent of the Line's Office, Paddington, to be Chief Clerk, Worcester, Divisional Superintendent's Office.

* * *

ON November 30 the portion of the South Yorkshire Joint Line between Maltby and Worksop was closed for passenger services. There was, however, only one train a day in each direction between the two towns. The district is well served by omnibus services operated by the East Midland Motor Company, of which the L.M.S. and L.N.E. Railways are the owners. The South Yorkshire Joint Line was opened throughout on January 1, 1909, and has a total length of approximately 21¼ miles.

* * *

THE first passimeter booking and ticket collecting office in the North of England has been opened by the L.N.E.R. at Manors East, Newcastle. Over 100,000 tickets are issued and over 200,000 collected at this station annually.

* * *

THE following new engines have been turned out of Swindon Works since September 9:—Passenger 4-6-0 (Hall Class):—No. 4956, *Plowden Hall*; No. 4957, *Postlip Hall*; No. 4958, *Priory Hall*; No. 4959, *Purley Hall*; No. 4960, *Pyle Hall*. Goods 0-6-0T:—Nos. 5770 to 5779.

* * *

AN illustrated lecture on "The Railways of Africa" was given, on November 12, by Mr. Charles Travis, M.Inst.T., Associate Editor, *The Railway Gazette*, at a meeting of the G.W.R. (Bristol) Lecture and Debating Society. Mr. F. W. Tyler, District Goods Manager, Bristol, was in the chair, and was accompanied by Mr. H. R. Griffiths, formerly Divisional Superintendent, Bristol.

* * *

THE L.N.E.R. announces that motor-cars and motor-cycles may now be parked at all stations where accommodation is available. The charges are 1s. per day for cars and 6d. per day for cycles, but special rates will be arranged for season-ticket holders and others who wish to avail themselves of the car parks regularly.

* * *

THE L.N.E.R. General Agent in New York (Mr. Harry J. Ketcham), who has hitherto had his offices at 311, Fifth Avenue, has now removed to 11, West 42nd Street. The new office is in the heart of the shopping and business section of New York, about 70 yards from the corner of West 42nd Street and Fifth Avenue, generally known as the busiest corner in the United States.

* * *

THE island of Bermuda, situated right out in the Atlantic Ocean, and a British naval station, is to have its first railway next spring—probably some time in April. The railway is 24 miles long, and it will cover the island, which is only a few square miles in size. The island is much frequented as a health resort by Americans and Canadians.

* * *

THE L.N.E.R. has introduced a new all-electric cooking and refrigerating kitchen and restaurant car on the 8.30 p.m. "Hook Continental" express from Liverpool Street. A special water filter is included in the

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equipment of this, the first electric restaurant car to be run on a Continental Boat Express.

* * *

CHANGING from steam to electric traction at a given point is usually translated by railways as delay. The Metropolitan allow 7 minutes, for example, at Rickmansworth. Recently, however, we saw the process conducted without a stop at Westoe Lane, on the South Sheilds, Marsden & Whitburn Colliery Railway, the steam engine slowing its train to about 10 m.p.h., and accelerating off it and down a siding when uncoupled. The train then caught up and was coupled to the electric locomotive, which had been started off just in front of it. —*Transport Observer.*

* * *

MR. E. L. P. QUESTED points out that certain remarks in regard to Southern Railway train service alterations given in the October number are open to misconception. He explains that the 8.30 a.m. and 2.35 p.m. from Ramsgate and the 3.35 p.m. train from Victoria, which now have first-class Pullman cars, run on Sundays only.

* * *

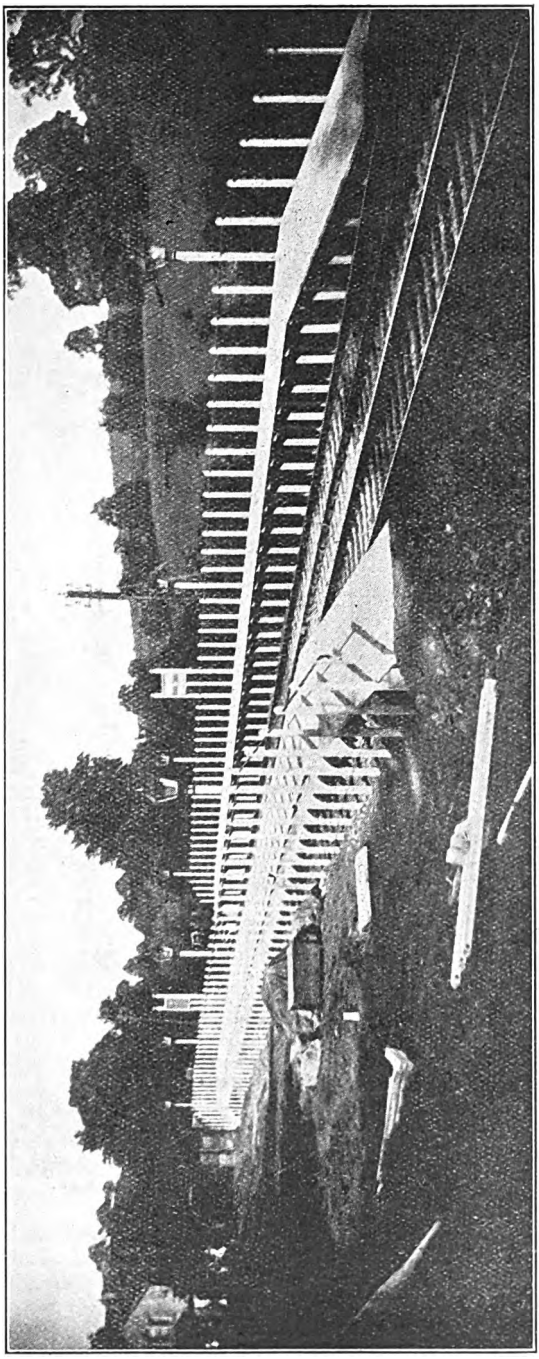
THE Shillibeer horse-drawn omnibus which was on exhibition for the last two months at Charing Cross "Underground" station has now been taken away and replaced by a 1930 model double-deck bus chassis manufactured by the Associated Equipment Co. Ltd., of Southall.

* * *

THE repainting of the roof of the L.N.E.R. station at King's Cross has now almost been completed, and illuminated signs indicating the cloak room, booking hall, waiting room, stationmaster's office, &c., will shortly be provided. New signs will also be erected on the approach road to the station for the better indication of the parcels forwarding office.

* * *

A NEW station on the Redway Estate at



SHOSCOMBE AND SINGLE HILL HALT, SOMERSET & DORSET JOINT RAILWAY.
This halt, between Radstock and Wellow stations, was brought into use on September 21. It was opened by The Rt. Hon. G. Lansbury, M.P., First Commissioner of Works.

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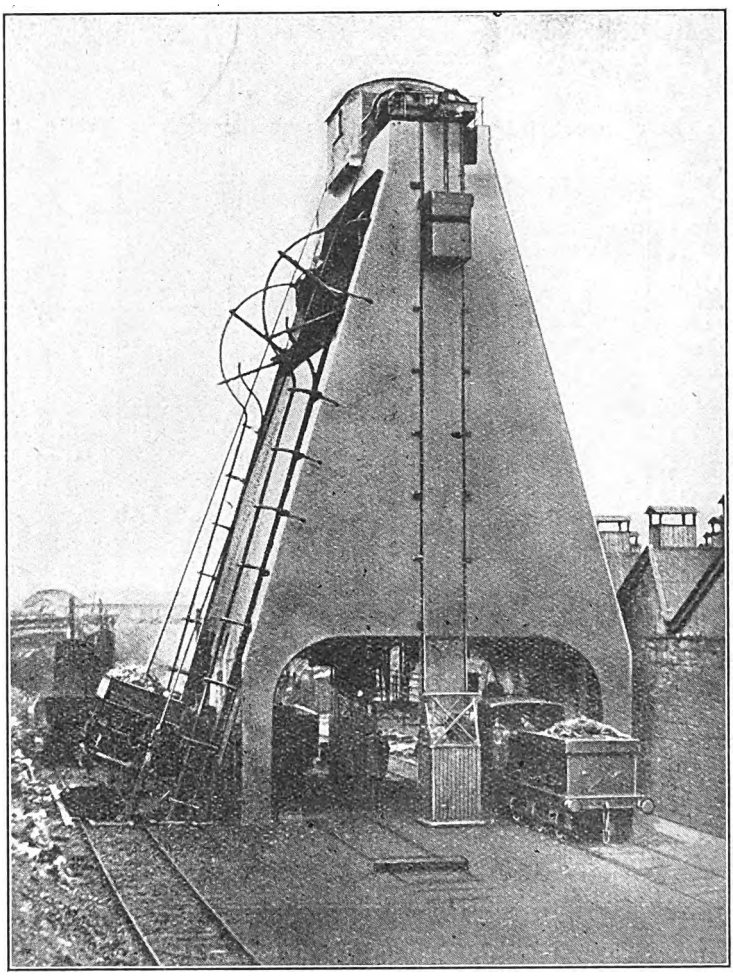

MITCHELL COALING PLANT AT INCHICORE LOCOMOTIVE DEPOT, GREAT SOUTHERN RAILWAYS, IRELAND.

West Twickenham, midway between Twickenham Junction and Whitton and Hounslow stations, is scheduled to open for traffic by the end of next spring.

* * *

ACCORDING to the *Great Western Railway Magazine*, a pair of points, 600 yards from the signal box, at Park Junction, Newport, are now worked by double wire transmission.

* * *

MEETINGS of the Transport, Observation and Models Society are now held at the Adelphi Hotel, John Street, Strand. Copies of the *Transport Observer* and other particulars can be had from Mr. S. M. W. Hann, Frensham, Shirley Road, Croydon.

MR. E. J. FASHAM suggests that an interesting query would be: On what train in England can one regularly see rolling-stock belonging to each of the four big companies, L.M.S.R., L.N.E.R., G.W.R., and S.R.?

* * *

L.M.S.R. OFFICIALS have inspected a site between Westcliff and Leigh for a new station to be known as Chalkwell Bay. It will be built just south-west of Chalkwell Park, Westcliff.

* * *

HARKER and Lyneside stations, the first two stops north of Carlisle on the Waverley route to Edinburgh, have been closed to passenger traffic.

* * *

FOLLOWING upon the policy of the L.N.E.R. of providing new and fast luxury steamers for their popular Harwich-Hook of Holland services, the company have sold to British shipbreakers the SS. *St. George*, triple-screw passenger steamer, built in 1906 by Cammell Laird & Co., of Birkenhead.

* * *

REUTER'S Durban correspondent states that the big Beyer-Garratt locomotive, which was recently placed in service, and which is colloquially known as *Oliver Twist*, on October 21 hauled a train load of 1,117 tons up to Cato Ridge, this being believed to be a record for the 3-ft. 6-in. gauge.

* * *

WORK has begun on an exploration shaft in connection with the scheme for tunnelling the Straits of Gibraltar. The shaft is being sunk near Tarifa, and next month a corresponding shaft will be drilled on Spanish Protectorate territory in Morocco.

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A 4-8-2 ENGINE lent by the Eastern Railway has been used for test runs between Paris and Cherbourg. According to a Central News report, it covered the 230 miles between Paris and Cherbourg in 4 hr. 50 min., and attained at times a speed of 75 m.p.h.

* * *

THE work of improving the road-bed of the German railways includes the laying on important lengths of rails 30 metres, or 98.4 ft., long. All the main lines traversed by fast through trains will eventually have rails of this length.

* * *

AN extensive scheme of re-signalling is being put in hand by the Bombay, Baroda & Central India Railway at Bombay Central station. The electro-pneumatic power system is being adopted, and the Westinghouse Brake & Saxby Signal Co. Ltd., of King's Cross, N.1, have received orders for the supply of a 119-lever power locking frame ; an illuminated diagram of the strip light type ; 35 A.C. track circuits complete with track transformers, relays, impedance bond layouts, reactances and rail insulations ; 34 electro-pneumatic facing point layouts complete with point indication relays, compressors, switchgear and air pipe line equipment ; 16 three-aspect colour light signals, and 21 globe-type shunt signals, complete with posts and fittings ; two 7-way route indicators ; 10 apparatus cases for relays, feeds, &c. ; and two 2-slide lever frames for control of shunting yards. The signal department of the Bombay, Baroda & Central India Railway will undertake the installation.

* * *

BRITISH railways have been paid another compliment by an American railway. The New York Central Railroad Company have adopted the chocolate and cream colour scheme of the Great Western Railway on two sets of coaches built for use on its *de luxe* day trains between Detroit and Cincinnati.

* * *

AERIAL SERVICES LIMITED and the Australian Commonwealth Railways Department are shortly to begin a combined service between Sydney and Perth, to occupy 35 hours, as compared with the present 108 hours by rail and 264 hours by sea. The single fare will be £28.

* * *

MR. T. J. B. KIDD points out that the name of "King Arthur" class 4-6-0 No. E796, illustrated on page 364 of the November number, at the head of down "Southern Belle" express, is *Sir Dodinas le Savage,* and not as stated.

* * *

A MEETING of the Little Western Railway Club was held on November 5 at 4, Windsor Terrace, Clifton, Bristol. Mr. H. L. Ashmead was in the chair. The first annual general meeting is fixed for Tuesday, January 7, 1930. Messrs. Vercoe and Holland gave an impromptu account of their joint visit to the G.W.R. Loco. Sheds at Bristol. This was followed immediately by a general discussion on G.W.R. locomotives.

* * *

"KING EDWARD VII" writes:—"Noticing in the November issue that Mr. W. G. Botting mentions that a 'Castle' class engine was seen working the 6.5 p.m. ex-Paddington to Worcester, the explanation can be given, because for a time 4-6-0 No. 4097 *Kenilworth Castle* was stationed there and worked between these two points in question. On the train mentioned above, No. 4097 was at Worcester during August and September, but since then I think she has been moved to Cardiff." The same correspondent mentions the unusual appearance of a 2-8-0 tender engine (goods class) on a Plymouth goods train, and that a number of the 2-8-0T's are also working in Devon and Cornwall.

* * *

A REFERENCE in *The Railway Observer,* the organ of the "Railway Correspondence and Travel Society" (Hon. Sec., Mr. D. S. Barrie, 5, Pittville Terrace, Cheltenham), enables us to give particulars of the renumbering of the "Tilbury" section engines now in progress. The small 4-4-2T's with 6-ft. wheels are taking Nos. 2056-91, the earlier and smaller 6 ft. 6 in. engines Nos. 2092-2109, and the large engines Nos. 2110-2150. This is further explained thus:—

Nos. 2135–2145	became	Nos. 2056–2066.
Nos. 2158–2175	,,	Nos. 2092–2109.
Nos. 2176–2179	,,	Nos. 2147–2150.
Nos. 2190–2214	,,	Nos. 2067–2091.
Nos. 2146–2157	,,	Nos. 2135–2146.
Nos. 2101–2107	,,	Nos. 2193–2199.

* * *

MR. A. ERNEST GLEN, writing from Glasgow, points out that the inscription to the illustration of G.W.R. French compound No. 103, *President,* reproduced on page 210 of the September, 1928, issue, does not correctly represent the situation. When first built this engine had a cab of Continental design, whereas the illustration in question showed it fitted with a round-topped roof and single side windows, with a G.W.R. pattern chimney.

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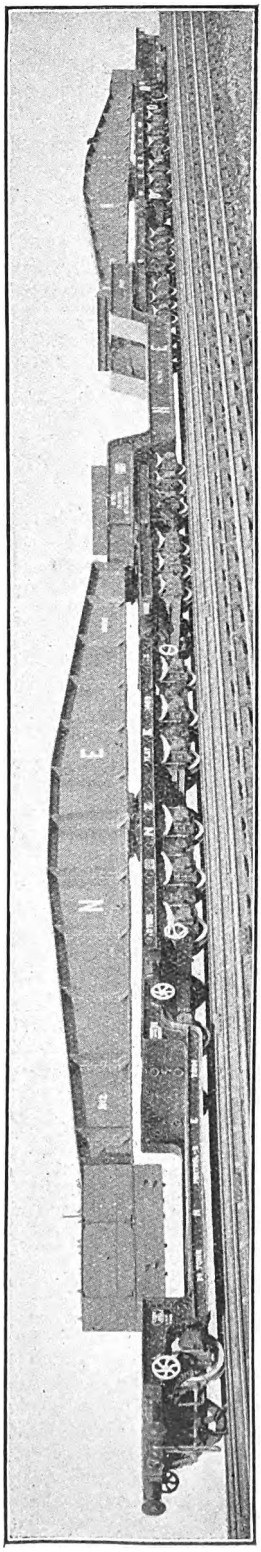
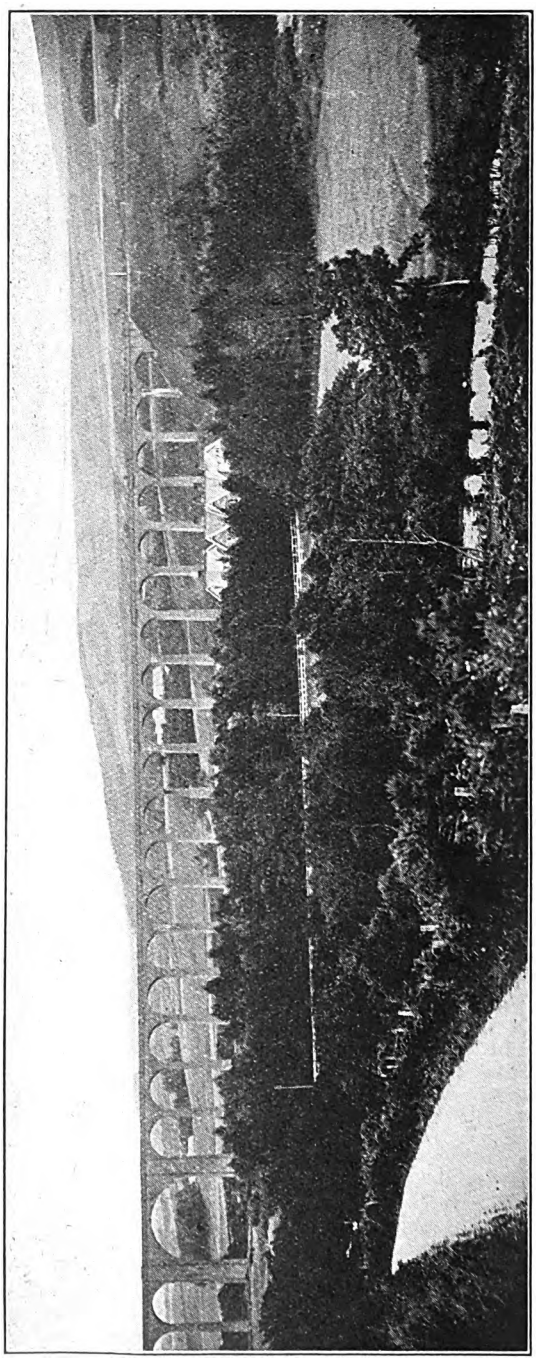


110-TON TROLLEY WAGON (ADAPTED FOR 150-TON LOADS), L.N.E.R.



Sport and General.] CULLODEN VIADUCT OVER THE RIVER NAIRN VALLEY, HIGHLAND SECTION, L.M.S.R.

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THE 20,000-ton Canadian Pacific liner *Duchess of Richmond* will, on January 25 next, leave Liverpool on a pleasure cruise of six weeks' duration to the "Isles of the Blest," West Africa. Full particulars of the cruise are contained in an illustrated booklet, which may be obtained on application to the Cruise Department, Canadian Pacific Railway, 62/65, Charing Cross, London, S.W.1.

* * *

LT.-COL. E. P. ANDERSON'S report to the Ministry of Transport on the collision which occurred at Hull (Paragon) station on Sunday, August 18, has been issued. A train worked by 4-4-0 No. 2016 came into collision with a set of 8 coaches standing on No. 4 platform line. There was a conflict of evidence as to the indications of certain signals, but the inspecting officer concludes that some of the witnesses were mistaken and that only the calling-on arm was off.

* * *

SUPPLEMENTING the particulars given previously, we now reproduce a photograph of Mr. H. N. Gresley's 110-ton trolley wagon for the L.N.E.R., which, in combination with the wagons and cantilevers shown, is capable of carrying stators up to 150 tons weight. The full set for carrying a load of 150 tons runs on 28 axles, and comprises one 110-ton well trolley wagon, two 60-ton flat wagons as pivots for the cantilevers, and two 20-ton well trolley wagons, as under-runners for the balance weights. The large trolley wagon has been used several times recently by itself for carrying ingots between Sheffield and Manchester, and on one occasion the ingot carried weighed no less than 120 tons.

* * *

THE L.N.E.R. announce that the new Monks Risborough and Whiteleaf Halt, between Princes Risborough and Little Kimble, was opened for passenger traffic on Monday, November 11.

* * *

WHEN the Royal Scots Greys left Edinburgh recently for Tidworth, the first of the four special trains was hauled by L.M.S. Engine No. 6101 *Royal Scots Grey*. This engine was placed at the disposal of the regiment at the request of the Officer Commanding.

* * *

MR. C. M. FURST writes:—"On Friday, October 11, 4-6-2 No. 2552 *Sansovino* left London at 10 a.m. on the 'Flying Scotsman,' and hauled it as far as Newcastle, where it arrived at 3.36 p.m. Later in the day it ran on a Gateshead turn to York and back, arriving back in Newcastle during the night. After re-coaling No. 2552 again left Newcastle at 3.14 a.m., this time for Edinburgh, where it arrived at 6.6 a.m., thus having completed no less than 552.9 miles within 18¼ hours, which, I think, must constitute a record distance for the time. At 10 a.m. the *Sansovino* left Edinburgh on the up 'Flying Scotsman,' which it worked right through to King's Cross, arriving there at 6.15 p.m. The total distance covered from King's Cross back to King's Cross was 945.6 miles, and all this was done within 36 hours. These distances do not include the shorter trips between the various stations and engine sheds."

* * *

MR. G. BRANDON-WHITE mentions that he noted recently on a platform hoarding at King's Cross (Metropolitan) station a large notice which stated: "On and after March 29th all cheap fare and excursion facilities (with certain exceptions) will be withdrawn." Obviously, a notice of this kind aroused curiosity, and Mr. Brandon-White explains as follows:—"On examining this somewhat startling announcement I found that it was dated February, 1915! Together with a Midland Railway suburban time-table for that date it has been brought to light by the removal of some advertisement hoardings which had apparently hidden it for the past 14 years."

* * *

MR. C. WILLIAMS writes:—"With further reference to the photograph of L.M.S.R. 0-6-0 tank engine No. 3186 *Euston*, which appeared on page 386 of the November issue, may I point out a slight error in your description. At the time the photograph was taken the engine was not fitted for condensing, as stated, the apparatus referred to having previously been taken off. The standard smokebox shown replaced the original Ramsbottom type, with sloping front, about five years ago. Although included in the renumbering scheme, as arranged by the L.M.S. in 1923, No. 3186, which was allotted No. 7335, was broken up under its old number, in July, 1928. The one other similar engine, No. 3021 *Liverpool*, now L.M.S. No. 7334, is still running, but without the condensing apparatus, and stationed at Widnes (shed 35w).

* * *

"Nos. 9574-83, now 0-8-0 standard superheater freight engines ex Crewe, are now in service and stationed at Crewe south shed. Of these previously turned out, Nos.

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9554-9, originally allocated to the Central Division, are now at work on the Midland Division. A series of fifty 2-6-0 mixed traffic engines ('13000' class) will shortly be put in hand at Crewe. 'G' class 0-8-0's Nos. 9089 and 9126 (old Nos. 2662 and 1577) have been converted to 'G1' class (superheater). L.T.S. 4-6-0 *Baltic* tank engines Nos. 2101-6 have been renumbered 2193-8."

* * *

THE Annual Meeting of the Wimbledon Model Railway Club will be held on January 6. On January 20 a lantern lecture will be given by Mr. R. W. Barrie (of the Railway Travel and Correspondence Society) on "The Great Central Railway." Both meetings will be at the Red Cross Hall, Church Road, Wimbledon. The December number of *Railway Pie* is quite a big issue, and a splendid example of Roneo work, including even the use of vari-coloured inks for maps and sketches. There is a good deal of interesting text. Copies can be had, price 6d. (7d. by post), from the Hon. Secretary, Mr. R. Shephard, 27, Bernard Gardens, Wimbledon, S.W.19.

* * *

ON December 2 the Railway Club held its monthly meeting at 57, Fetter Lane, E.C.4, when Mr. Barry gave his paper on "Signals and Signalling." The lecture dealt not only with British practice, but also with Continental and American as well, and traced the growth of signals from the infancy of railways. The object of the paper was to show how the present somewhat complicated system of signalling both by day and by night had developed from primitive beginnings. The paper covered considerable ground, and was followed by a lengthy discussion, when various points dealt with by the lecturer received further elucidation, and some additional matter was introduced and discussed.

* * *

THE locomotive involved in the disaster on the Somerset and Dorset Joint Railway on Wednesday, November 20, when a goods train got out of control and crashed into the yard inspector's office at the L.M.S. goods depôt at Bath was No. 89, one of the latest of the *Consolidation* type, which was built in 1925.

* * *

MR. F. HAHN sends a programme of N.S.L. excursions which shows some remarkable timings. "The run from Surbiton to Salisbury in 61 minutes is faster than the 'Atlantic Coast' express, and the timing to Axminster is better than an ordinary train. Also the Bournemouth train on the return journey is allowed 2 minutes from Central to Christchurch, and shows a saving of 14 minutes compared with the down journey! The Folkestone run is also very good, 88 minutes from Hither Green to Central, but the return trip shows 1 hour 55 minutes. Perhaps there is a misprint as regards some of these timings; they seem really too good for excursion trains!"

* * *

THE Southern Railway Company has issued a very fine poster in connection with the "Golden Arrow de Luxe Pullman Daily Continental Service." The feature of the production is a striking coloured view—running the full width of the poster—of a Pullman train, drawn by the *Sir Richard Grenville*. The picture is excellently reproduced and the colouring is very natural. The rest of the poster is used for the delineation of a golden arrow and for letterpress. The latter is coloured and harmonises with the picture—and emphasises the fact that the complete journey to Paris takes 6½ hours. Copies of the picture, in colour, may be obtained, price 1s.—also as a jig-saw puzzle, price 5s.—from the Advertising Department, Southern Railway, Waterloo Station, London, S.E.1, and through Messrs. W. H. Smith's bookstalls and shops.

* * *

MR. G. L. DARBYSHIRE has been appointed Chief Officer for Labour and Establishment of the London Midland & Scottish Railway, in place of Mr. W. Clower, who retired at the end of the year.

* * *

THE Southern Railway Company announce that Viscount Folkestone, the eldest son of the Earl of Radnor, has been elected a Director of the company.

* * *

MR. R. H. SELBIE, General Manager, Metropolitan Railway, has been unanimously elected Chairman of the General Managers' Conference of the Railway Clearing House for the new year.

* * *

WE are officially informed that the London & North Eastern Railway Company have made the following appointments:—

Mr. W. J. Pepper, Assistant to Divisional General Manager, Southern Area, to be Assistant Passenger Manager, Southern Area.

Mr. H. F. Sanderson, Assistant to District Goods and Docks Manager, West Hartlepool, to be Assistant District Goods Manager, Newcastle-on-Tyne.

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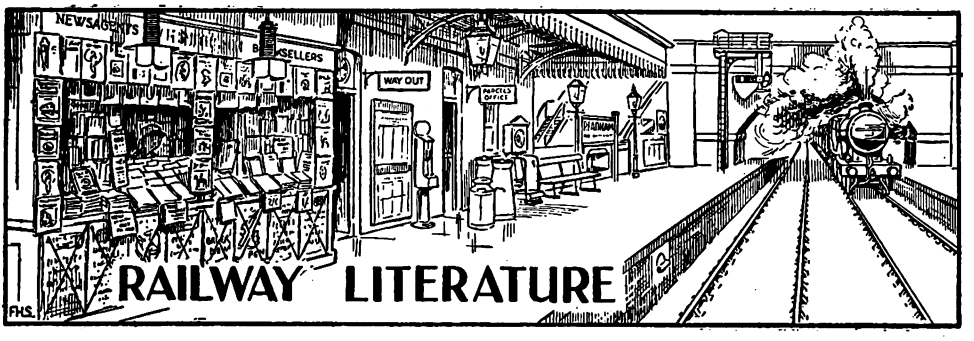

THE WONDER BOOK OF RAILWAYS. 14th Edition. Edited by Harry Golding. Published by Ward, Lock & Co., Ltd., Warwick House, Salisbury Square, London, E.C.4. Price 6s.

The fact that, even after a lapse of so many years since the first edition of "The Wonder Book of Railways" was published, there is a continued demand for a new edition, indicates that, despite the many new interests which have arisen during the twentieth century, the fascination of the railway remains as strong as ever, not only for the younger generation but also for those who bring an adult mind to bear upon its interests and attractions. While, however, the 14th edition now under notice maintains the characteristics of its predecessors, and a few of the articles and illustrations which continue to be of interest remain within its pages, the volume has been made the subject of extensive revision, and is, to all intents and purposes, a new publication, dealing with many aspects of railway machinery and operation on an up-to-date and topical basis. Thus, a large number of the illustrations are entirely new, those of trains representing the favourite expresses of to-day and those of engines of the latest classes, while under other headings there is similar up-to-dateness. As usual, a special feature is made of the colour plates, of which there are ten, apart from a folding plate in colour of a section of an L.N.E.R. 4-6-2 engine, with the parts associated with a reference table, while the cover retains the characteristic view from the footplate of a London and North-Eastern locomotive showing approach to "the tunnel ahead." There are also some 300 ordinary illustrations, printed in an attractive tint, while the text directs attention to all phases of railway operation, including consideration of railways and railway scenes in other lands. Altogether, it may be taken for granted that this volume will be quite as popular as its predecessors and that many who have on their shelves the complete series of the earlier volumes will make a point of adding the 14th, while readers to whom these books are new will unquestionably wish to obtain copies. Incidentally, those in difficulty about choosing a Christmas present for a youthful son or nephew cannot go far wrong in deciding upon "The Wonder Book of Railways."

SECOND SPECIAL INDIAN AND EASTERN NUMBER OF "THE RAILWAY GAZETTE." Published by *The Railway Gazette*, 33, Tothill Street, S.W.1. 168 pp., with large coloured map, 267 half-tone illustrations, and 32 maps and diagrams. Price 2s. 6d.

The first special Indian and Eastern Number was reviewed in our issue of November 15. The Second Special Number, now published, is even bulkier than its predecessor, and certainly abates nothing in interest by comparison.

The Second Special Number deals with the company-managed railways in India, and also covers the railway systems of Siam, Japan, Manchuria and China. There is a special map of the company-managed lines in India, and the articles describe the Bombay, Baroda & Central India, the Bengal-Nagpur, the Madras & Southern Mahratta, the South Indian, the Bengal & North Western, the Nizam's Guaranteed State Railway, the Darjeeling-Himalayan and the Assam-Bengal systems. These several systems total some 17,000 miles of line, and are greatly varied in their physical and other conditions. The Bombay, Baroda is the largest company-managed line in India, and provides India's fastest daily service, the "Frontier Mail." The Bengal-Nagpur carries heavy mineral freight and a large pilgrim traffic. The Bengal & North Western, the chief private line, also operates the Rohilkund & Kumaon, and has heavy cross-river traffic on the Ganges. Heavy development work is in hand on the South Indian, while the Darjeeling-Himalayan stands in a category of its own, as an interesting 2-ft. gauge mountain line rising to an altitude of 7,400 ft. and worked by adhesion.

Editorial articles in this Number deal

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with the Indian Railway Board, railway travel in the East, Indian and British rolling-stock and materials, and company-managed railways, and amongst other articles there is one dealing with the difficult problem of railway catering in India. The large coloured plate of the railways of India published with the First Special Number is included again here for convenience of reference.

Turning to the Eastern Section, detailed articles describe the Royal State Railways of Siam, 1,875 miles in length, the highly efficient Japanese Government system, 8,355 miles in length, the Japanese Colonial railways, and the rapidly developing South Manchuria line ; and brief particulars are given of the railways of China. A very useful directory of Indian and Eastern railways is included.

Again, however, as with the First Number, what may fairly be termed the special glory of this publication is the wonderful collection of typical views of Indian and Eastern railways, here even larger than in the First Special Number, and presenting scenes of absorbing and varied interest, and in some instances of striking beauty. This collection, in both numbers, constitutes a unique feature of the publication, and the whole enterprise, we may be permitted to say, reflects the greatest credit on those who were engaged in it, especially the many authorities and officials throughout India and the East, without whose cordial co-operation success would not have been possible.

Royal Train for H.M. The King of Italy.—The Fiat Press Bureau, of 115, Avenue des Champs-Elysées, Paris, send a beautifully produced booklet describing the new Royal Train recently completed by the Railway Material Section of the Fiat Company for H.M. the King of Italy. The train comprises, as a basis, three special coaches—one for the use of the Queen, the centre one for the King, and the third a dining saloon. We gather from the photographs reproduced that the various sections have been designed on the most advanced lines, the decoration and equipment being of a very high order, justifying the description which has been given to the train by a well-known Italian journalist that it constitutes "a genuine work of art," not only in the restricted sense of being artistically decorated, but also in the broader sense that the engineers, draughtsmen and workmen of the Sezione Materiale Ferroviario of the Fiat Co. have designed and built it with all the jealous care of true artists. Each coach is 64 ft. 7½ in. long, exclusive of the buffers, and in each of the saloons for the use of their Majesties there is a parlour, bedroom and lavatory, two or three compartments for the aides-de-camp and Gentlemen-in-Waiting, and accommodation for the Royal servants, with vestibule, &c. In the dining coach, besides the dining saloon with 23-ft. table and twenty chairs, room has been found for a vestibule, a pantry and a private parlour for the King. This fine blue train, emblazoned with the Royal Crown, can run over any railway system in Europe, for the coaches bear the mystic inscription 'RIC,' which in railway language means 'coach workable over all European lines.' In fact, they are equipped with all the various fittings and attachments in use on the different railway systems. Thus, there are three separate braking systems: an automatic compressed air brake as is in use on the Italian State lines, a variable one as employed in France, and a vacuum brake for use over Austrian railways. Two distinct electric lighting systems are installed ; one fed off accumulators on the Italian pan, and the other worked directly from a dynamo for use when travelling over foreign lines. In case of failure of both systems, candle lamps are carried in reserve. The beautiful train speeds, resplendent in daylight, mysterious at night ; a blue and black streak with a slight break every 60 feet. In the daytime it is impossible for something of its internal splendour not to show through ; the gleam of gold, the soft sheen of silks and rare velvets, polished glass, delicately tinted blinds, creating an impression that it is no ordinary train that is passing, but a heavier, more silent and more comfortable train than usual ; a train which shuts out both noise and dust, in which one passes with even, steady steps from one coach to another as in a padded passageway, a train in which doors and windows shut easily and tightly and where everything fits exactly. At night the thick, soft curtains prevent any gleam of light from shining forth. Even the light in the vestibule goes out when the door is closed and the folding steps automatically close up."

Meccano Ltd. send three interesting booklets. One is the "Hornby Book of Trains" for 1929-30, a splendid threepennyworth, in view of the numerous illustrations, interesting text and useful information given within the coloured covers. The others are more of catalogue character, but are distinctly interesting. They are (1) "How to Plan Your Hornby Railway," price 3d., and (2) a general Meccano catalogue.

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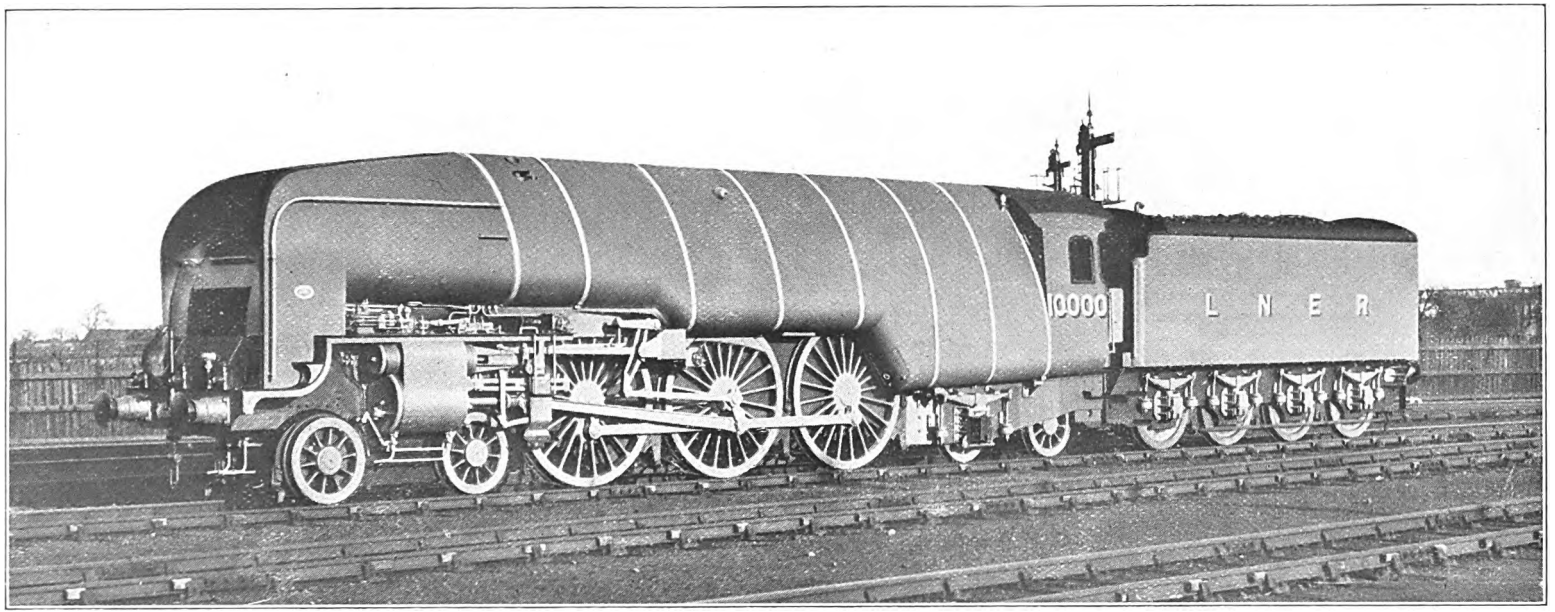

THE RAILWAY MAGAZINE.]

4-6-4 HIGH-PRESSURE WATER - TUBE BOILER LOCOMOTIVE, L.N.E.R.

This locomotive, designed by Mr. H. N. Gresley, C.B.E., Chief Mechanical Engineer, L.N.E.R., is the largest passenger locomotive so far constructed for service in Great Britain and is also the first tender engine of the 4-6-4 type to be introduced in this country. It is fitted with a Yarrow-Gresley water-tube boiler, supplied by Yarrow & Co. Ltd., of Glasgow, and having a working pressure of 450 lb. per sq. in. The four cylinders work on the compound principle, the inside high-pressure cylinders being 12 in. diam. by 26-in. stroke, driving on to the leading coupled wheels. The outside low-pressure cylinders drive the intermediate coupled wheels and are 20 in. diam. by 26 in. stroke. The coupled wheels are 6 ft. 8 in. diam. The tender is carried on eight wheels and is of the corridor type, as used on the Pacific locomotives. The exterior contours of this locomotive were the subject of very considerable experiment with models in a wind flume, and their adoption marks a wide departure from conventional appearance. After preliminary trials the locomotive will be tested in actual service on the L.N.E.R. main line between London (King's Cross) and Edinburgh (Waverley).

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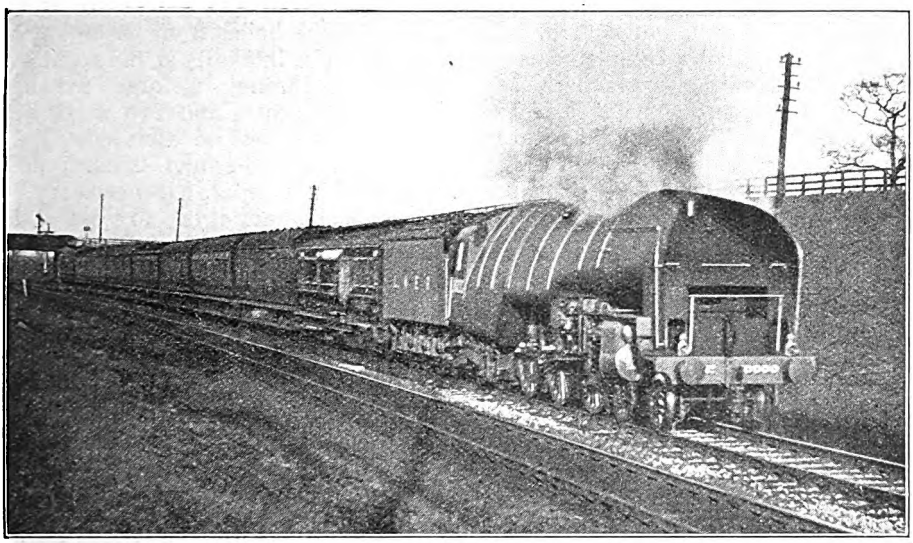

Photo.] [*W. Rogerson.*

4-6-4 LOCOMOTIVE No. 10000 ON TEST TRAIN NEAR DARLINGTON.

4-6-4 High-Pressure Watertube Boiler Locomotive, L.N.E.R.

A VIEW is given as Frontispiece of Mr. H. N. Gresley's 4-6-4 compound high-pressure water-tube boiler locomotive No. 10000, which was just completed when we closed for press last month.

The following table summarises the principal dimensions of the locomotive:—

Cylinders—	
Inside H.P. diam. ..	12 in.
,, stroke ..	26 in.
Outside L.P. diam. ..	20 in.
,, stroke ..	26 in.
Valve motion	Gresley-Walschaert.
Piston valves diam. H.P. ..	6 in.
,, ,, ,, L.P. ..	8 in.
Maximum travel H.P. ..	$6\frac{13}{16}$ in.
,, ,, L.P. ..	$6\frac{11}{16}$ in.
Steam lap, H.P.	$1\frac{3}{4}$ in.
,, ,, L.P.	$1\frac{5}{8}$ in.
Exhaust lap	Nil.
Cut-off in full gear, H.P. ..	80 per cent.
,, ,, L.P. ..	75 per cent.
Boiler pressure	450 lb. per sq. in.
Coupled wheels, diam. ..	6 ft. 8 in.
Adhesion weight	62 tons 10 cwt.
Weight of engine (in working order)	103 tons 12 cwt.
Weight of tender (in working order)	62 tons 8 cwt.
Total weight of engine and tender (in working order) ..	166 tons.
Tender coal capacity ..	9 tons.
Tender water capacity ..	5,000 gallons.

Particular interest attaches to the boiler. As it was proposed to use a boiler pressure of 450 lb. per sq. in., one of a water-tube type was decided upon. This has been designed by Mr. Gresley in conjunction with Mr. H. E. Yarrow, specially to meet the requirements of locomotive service, and has been constructed by Yarrow & Co., Ltd., of Glasgow. It is built up with one steam drum 3 ft. 0 in. inside diameter by 27 ft. $11\frac{5}{8}$ in. long, and two water drums on either side of the firebox each 18 in. in diameter and 11 ft. $0\frac{5}{8}$ in long, and two other drums under the forward part of the boiler each 19 in. in diameter and 13 ft. $5\frac{3}{4}$ in. long. The forward drums are connected to the steam drum by 444 2-in. tubes and 74 $2\frac{1}{2}$-in. tubes. The drums at the side of the fire grate are connected to the steam drum by 238 $2\frac{1}{2}$-in. tubes, and there is a back screen of 12 $2\frac{1}{2}$-in. tubes. All the drums are solid forged and machined all over.

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The use of a pressure of 450 lb. has, of course, necessitated a complete change in all the ordinary boiler practices, and special forms of safety valves, regulator, water-gauge and injectors have had to be provided. The safety valves, relief valves, reducing valves and regulators have been supplied by Cockburn & Co., of Glasgow, who specialise in high-pressure boiler mountings. The main regulator admits high-pressure steam to the high-pressure steam chests. To facilitate starting an additional supply of steam can be admitted through a small 1-in. diameter regulator to the low-pressure steam chest, but this must be closed directly the engine has got away. In order to prevent too high a pressure in the low-pressure steam chests a "Pop" safety valve is fitted which blows off if the pressure reaches 200 lb. per sq. in.

For the auxiliary services, such as the ejector, steam sanders, whistle, steam heater, injector steam supplies, several additional fittings are provided. There is a manifold above the fire-hole door from which the connection to the auxiliary services is taken. This manifold is supplied with steam by a reducing valve of Cockburn's make, which maintains the steam pressure in the manifold at 200 lb. per sq. in. There are two injectors fitted to the boiler—one high-pressure injector, by Gresham & Craven, and the other, taking low-pressure steam from the auxiliary steam manifold, supplied by Davies & Metcalfe. A special form of superheater, supplied by the Superheater Company, has been fitted in the main flue on the boiler side of the regulator, so that the elements are always under full steam pressure. The elements are connected to two forward headers located immediately in front of the water tubes.

The boiler is of ample capacity to supply the needs of the locomotive, and when tested at the makers' works on a four hours' test at 450 lb. pressure gave an evaporation of 20,000 lb. per hour. The combustion gases, after passing between the tubes, are taken down each side of the boiler through two flues. There is an air space between these flues and the outer casing, and the air supply to the ashpan for combustion purposes is taken through this air space, the object being to preheat the air, also to prevent the outer casing of the boiler from becoming overheated. The intake is at the front of the smokebox through a large rectangular hole in the centre and two smaller rectangular holes, one on each side, and the air supply to the ashpan is controlled by means of a damper. If necessary, cold air can be admitted to the ashpan through the front damper, though this damper is intended primarily for the removal of ashes. It is expected that sufficient preheated air will be obtained from the smokebox to meet the combustion requirements.

One of the difficulties to be expected with the water-tube boiler is in connection with the formation of scale, and in order to overcome this, the feed water is introduced into the forward portion of the steam drum, where there are no water tubes. A weir extends across the bottom half of the drum at the back of this space, over which all water which is supplied to the boiler for evaporation purposes has to pass. The feed water is delivered into the forward space by means of heater injectors, which it is anticipated will raise the temperature of the water to something over 400 deg. F. At such a temperature it is hoped that the greater part of the scale and impurities in the water will be thrown down in this space. Means are provided for blowing off scale or sludge in this forward portion of the boiler without interfering with the water in the evaporative portion.

The front end of the engine is of novel design, as the boiler is built to the extreme limit of the gauge. Therefore, it is not possible to have a chimney of the ordinary pattern projecting above the top line of the boiler. Before arriving at the shape of the front end, Mr. Gresley carried out experiments, in conjunction with Prof. Dalby, at the City and Guilds Technical College. A wooden model of the engine was tested in a wind tunnel through which air was passed at about 50 m.p.h., and powdered chalk was projected through the chimney. The contour of the front of the smokebox has been so arranged that the steam and smoke escaping from the chimney should be thrown upwards and not interfere with the driver's vision from the cab.

The engine is a four-cylinder compound, having two high-pressure cylinders, each 12 in. diameter and 26 in.

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stroke, driving on the front coupled axle. These cylinders are placed very close together, being only 14 in. centre-to-centre, the object of bringing them together being to have a large bearing for the axle-boxes. This arrangement has necessitated the designing of a new form of crank with a single central web. The inside cylinders, steam chests and low-pressure receiver are made of one steel casting, the cylinders being lined with a cast-iron liner of a special composition.

The low-pressure cylinders are situated outside the frames and are standard with the cylinders used on the "Pacific" engines, being 20 in. diameter by 26 in. stroke. The connecting rods, coupling rods, etc., are similarly standard with those used on the "Pacifics."

Two sets of valve gear are employed for operating the four valves. Walschaerts valve gear is fitted to the outside cylinders and the valves of the inside high-pressure cylinders are operated by means of a novel rocking shaft arrangement patented by Mr. Gresley. The inside arm of the rocking shaft is slotted and carries a die block, to which the valve rod is attached. It is possible to vary the cut-off of the high-pressure cylinders independently of that of the low-pressure cylinders by raising or lowering the die block in the slot.

There are two sets of steam reversing gear, one to control the Walschaerts valve gear and the other to control and vary the cut-off of the high-pressure cylinders. The steam valves operating these reversing gears and the cylinder cocks are operated from the footplate by telemotors made by McTaggart Scott, of Edinburgh. Wakefield mechanical lubricators supply oil to the cylinders and steam chests and to the coupled axle-boxes.

The trailing end of the engine is carried on two axles, the forward one being similar to that in the "Pacific" engine, having Cartazzi axle-boxes, and the rear one fitted to a Bissel truck with the centre located immediately under the front of the firebox. It was not possible to fit a bogie to the trailing end.

It will be seen that the engine in working order weighs 103 tons 12 cwt., and it is interesting to note that this actual weight varied only 5 cwt. from the estimated weight before the engine was built. The engine has not been built in order to secure increased power or increased speed, as compared with the "Pacific" engines, the whole object of the introduction of high-pressure steam being to promote fuel economy. The engine is fitted with a corridor tender of the standard type as used on the company's "Pacific" engines.

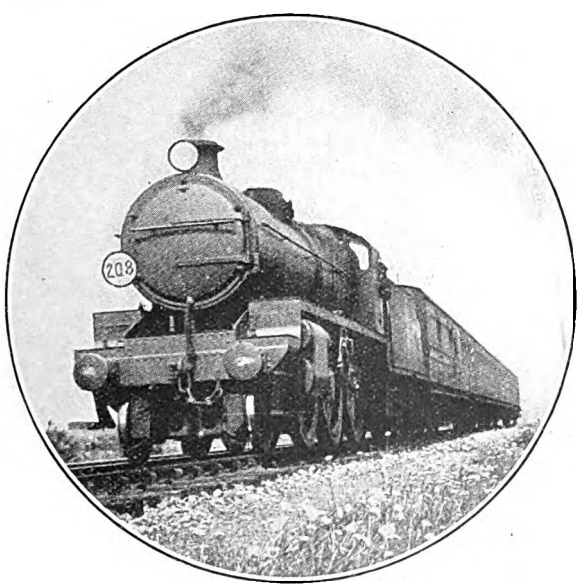

Photo.] [*E. C. Griffith.*

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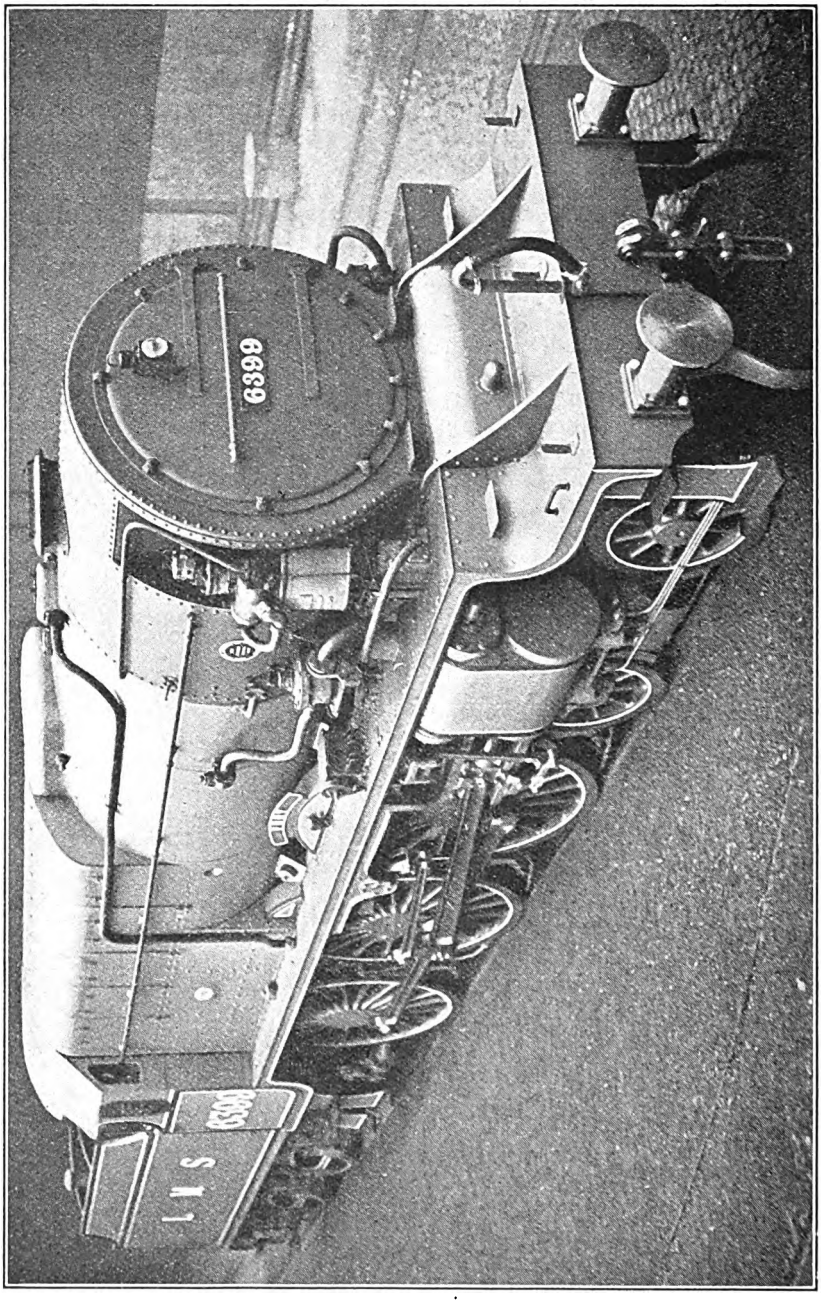

THE NEW "ROYAL SCOT" DOUBLE-PRESSURE COMPOUND LOCOMOTIVE, L.M.S.R.

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Double-Pressure Compound "Royal Scot" Locomotive, L.M.S.R.

THE experimental high-pressure locomotive, designed by Sir Henry Fowler, K.B.E., Chief Mechanical Engineer, which the London Midland and Scottish Railway decided to build, in conjunction with the Superheater Co., Ltd., at the works of the North British Locomotive Co., Ltd., has now been completed.

The design follows the "Royal Scot" class with regard to the frame, but in this case the engine is a three-cylinder compound, the high-pressure cylinder being situated between the frames and the two low-pressure cylinders outside the frames. The boiler provided is of the Schmidt high-pressure type. The design of the latter is based on that of the experimental boiler which was built for one of the Continental railways, the trials of which were entirely satisfactory.

The Schmidt high-pressure boiler consists of three distinct systems or boilers, each carrying a different pressure. The system having the highest pressure, 1,400-1,800 lb. per square inch, the variation in pressure depending on the rate of firing, is in the form of a "closed circuit," consisting of a number of pipes which form the sides, roof and back end of the firebox. These pipes are connected at the bottom to a foundation ring and at the top to equalising drums, being expanded thereinto. From the equalising drums, pipes are led to evaporating elements which are situated in the high-pressure drum.

This closed circuit is initially filled to a predetermined level with pure water, and this latter is the medium by means of which heat is transmitted from the firebox to the evaporating elements in the high-pressure drum, which furnishes steam at 900 lb. per square inch for the high-pressure cylinder of the locomotive. This drum is of nickel steel, but is not in contact in any way with the fire. It is fed by water drawn as required from the low-pressure boiler by means of a pump.

The low-pressure boiler occupies the same position as the barrel of the normal locomotive boiler, and the water is evaporated by the gases passing through the boiler tubes. The barrel of this low-pressure boiler is also of nickel steel, but both tube plates are of mild steel.

An ordinary live steam injector is provided on the driver's side, and an exhaust steam injector on the fireman's side of the engine to feed the low-pressure boiler.

As steam is raised much more quickly in the high-pressure drum than in the low-pressure boiler, arrangements are made to bye-pass, by means of an intercepting valve, any excess steam from the high-pressure drum into the low-pressure boiler, thus avoiding waste through blowing-off.

The method of working this locomotive is more or less normal. The regulator handle works both the high-pressure and the low-pressure regulator simultaneously. On opening the regulator, steam is admitted into the high-pressure cylinder after passing through the high-pressure superheater situated in the lower boiler tubes. Exhausting from the high-pressure cylinder, the steam enters a mixing chamber, where it is met by low-pressure steam at 250-lb. pressure, which has previously passed through a low-pressure superheater situated in the upper boiler tubes. From the mixing chamber steam enters the two outside cylinders.

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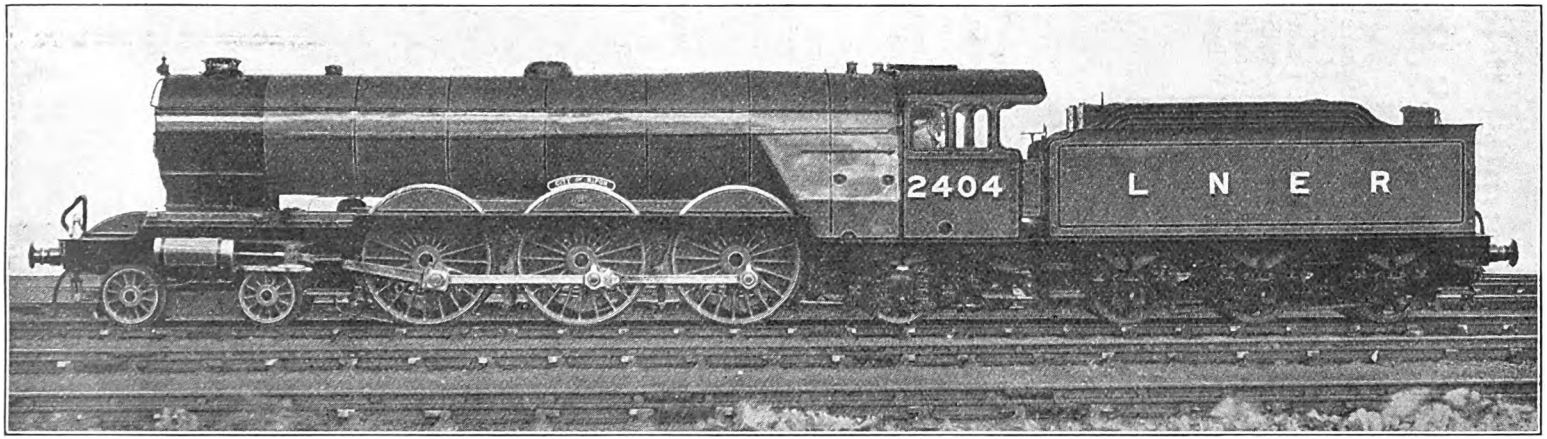
RE-BOILERED 4-6-2 EXPRESS LOCOMOTIVE, L.N.E.R.



By the courtesy of Mr. H. N. Gresley, C.B.E., Chief Mechanical Engineer, London and North Eastern Railway, we are enabled to reproduce a photograph of one of the North Eastern Section "Pacific" locomotives as fitted with a boiler similar to that designed by Mr. Gresley for the Doncaster-built engines, having the same wheel arrangement. The only difference between the original design and the present one is in respect of the boiler and cab.

Although the new boiler has a greater evaporative capacity, the total weight of the engine has, by virtue of the change, been reduced by 3 tons 10 cwt. The tractive power is decreased, this being due to the reduction of boiler pressure from 200 lb. to 180 lb. per sq. in.

It will be noted that the original boilers carried three Ross Pop safety valves one behind the other on a combined mounting, whereas in the new boiler these valves are reduced to two in number. In this case the three cylinders all drive the leading coupled wheels and the valve motion is inside, whereas in the Doncaster-built engines the three cylinders drive the middle pair of coupled wheels, the steam being distributed by means of Walschaerts gearing outside the frames, with Mr. Gresley's valve gear arrangement.

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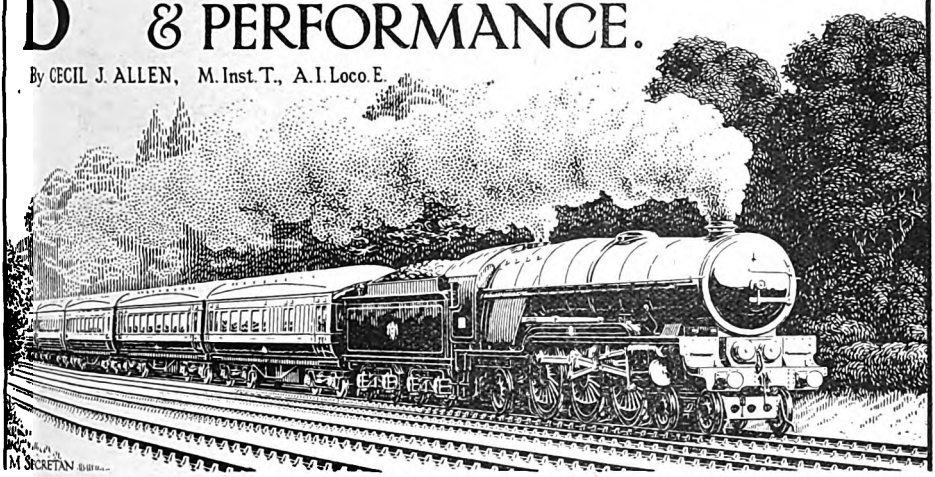
BRITISH LOCOMOTIVE PRACTICE & PERFORMANCE.

By CECIL J. ALLEN, M. Inst. T., A. I. Loco. E.



LETTERS continue to reach me in connection with the recent discussion of the question of locomotive standardisation in this country, and of these communications, without necessarily associating myself with the views expressed, I must quote two. "Obviously standardisation is an excellent thing," begins one writer, "but to obtain the full benefits your standardisation must be general. It would appear that on the London Midland and Scottish system the locomotives have been singled out for standardisation before the permanent way, and that the standard of power has had to be lowered all over the system in order to suit one portion. The consequence is that large numbers of what would, on the other grouped lines, and, indeed, throughout the rest of the world, be considered as obsolescent types, are being multiplied.

"Leaving the Great Western Railway out of account for the moment, we find that on the other two groups a certain amount of locomotive standardisation has taken place, but that it has been throughout of a progressive character. For example, the London and North Eastern Railway 'Pacifics,' which are still being built, can work over most of the London and North Eastern Railway main lines and carry any load single-handed—the runs over the 'Waverley' route, described in your last article, are a striking instance of the latest and most successful extension of their activities—and over routes where their weight is still prohibitive there are available powerful 4-6-0 locomotives, as well as the large-boilered 2-6-0 mixed traffic engines. The old 'Atlantics,' the Great Northern especially and also those of the Great Central and North British Sections, continue to do their work with satisfaction, as well as the 4-6-0 engines of the Great Eastern Section; but when these engines are replaced, it is by more powerful machines, rather than by less powerful, as on the London Midland and Scottish.

"Again, the Southern Railway, instead of standardising their lightest variety of 4-4-0 engine, to which weak underline bridgework compelled them to restrict the boat-train workings between Victoria and Dover, built large numbers of 'King Arthur' 4-6-0 locomotives, and strengthened their track to suit. Not only has the use of these engines rendered possible considerable economies in *personnel,* owing to the reduction of double-heading, but I believe I am right in claiming them to be the most economical engines in their day-to-day running and maintenance expenses on the Southern system. Again, for the particularly difficult conditions of the Hastings route, special 3-cylinder 4-4-0

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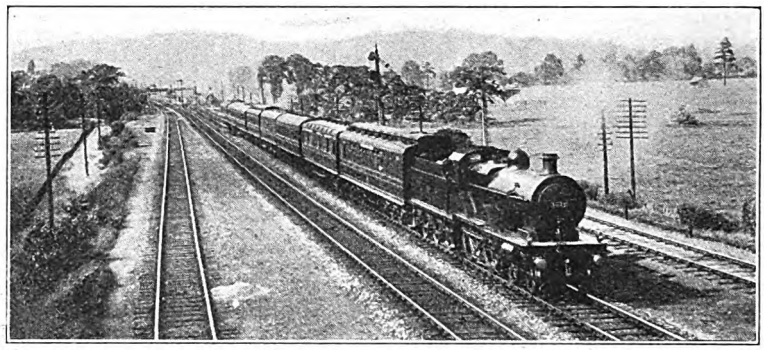

Photo.] [*H. Gordon Tidey.*

UP MANCHESTER EXPRESS NEAR DUFFIELD, L.M.S.R.

Compound 4-4-0 No. 1012.

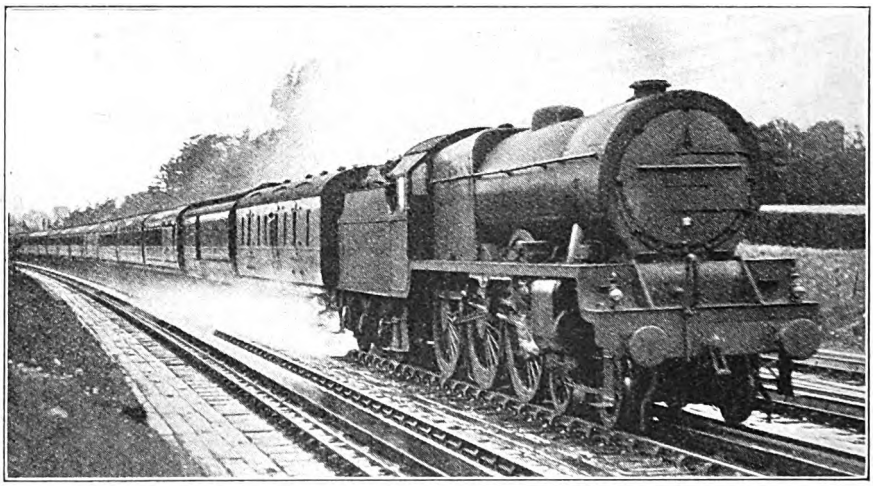

Photo.] **UP IRISH MAIL ON CASTLETHORPE WATER TROUGHS, L.M.S.R.** [*F. R. Hebron.*

4-6-0 No. 6102 *Black Watch.*

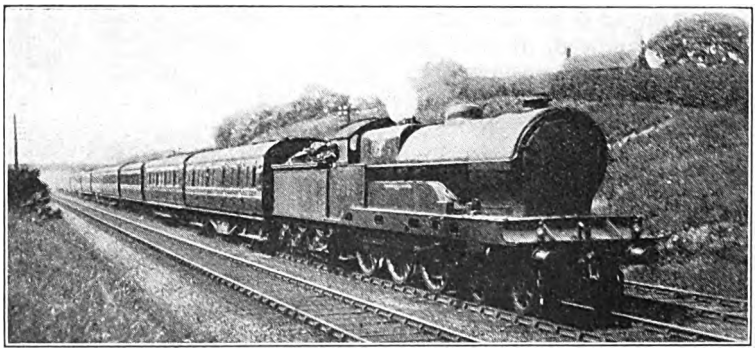

Photo.] **UP "LANCASTRIAN" EXPRESS NEAR BRINKLOW.** [*F. J. Arthur.*

Rebuilt 4-6-0 No. 5999 *Vindictive.*

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locomotives, of a tractive power but little, if at all, inferior to that of the 'King Arthurs,' are now under construction.

"My criticism of the London Midland and Scottish locomotive policy is, therefore, that any locomotive types light enough or small enough to work over those portions of the line where weight restrictions obtain are the types chosen chiefly for multiplication, and that then, if one locomotive per train is not sufficient to handle the traffic, two are used. You have often emphasised the economic value of the powerful and up-to-date locomotive working, in general, well within its powers, and able, exceptionally, to handle loads of abnormal dimensions without piloting, thrashing or loss of time, and, in my judgment, the Gresley 'Pacifics' have justified this contention up to the hilt. Since their recent modification of valve-motion, these locomotives have, I believe, proved themselves to be—taking all circumstances into consideration, and especially average loading, aggregate mileage and total shed-hours—the most powerful as well as the most economical units of railway tractive power in Great Britain."

Another letter, from Canada, draws much the same moral. "It has rather amused me," says the writer, "to read about such-and-such engines being built, and then to read, about a year later, of another and heavier class being designed to handle the same traffic. It seems hardly necessary to turn out 20 or 30 engines of a class in order to see whether or not they can handle their trains! The East Coast combination appears to have done well in this direction. When you consider for how long the Great Northern 'Atlantics' succeeded in 'holding their job down,' and, similarly, the North Eastern and the North British 'Atlantics,' it would seem that these three companies built sufficient power into their engines to last for a long while ahead. And now the Gresley 'Pacifics' have arrived, with more power still in hand for future developments. The Great Western began to look ahead at an even earlier date. All of which clearly supports your argument that the cheapest plan in the end is to scrap the old engine and build something up to date. It might do some British designers of motive power good to take a leaf out of the book of the Canadian National Railways by designing some locomotives capable of hauling 1,000-ton express trains on the level at 70 miles an hour, and five or six times that weight of freight stock at 30 miles an hour or so. During the past six years I have never seen a double-headed train on the Canadian National lines."

Unfortunately, even if such locomotives were designed, there would be the impossibility of passing them through our bridges and tunnels, unless the "Garratt" or some similar principle of articulation were brought into use. And in any case, is it necessary to hurry quite so far ahead of present needs as this? American and Canadian coaches, of all-steel and very massive construction, weigh anything up to 70 or 80 tons apiece, and a train of thirteen or fourteen such cars may, and frequently does, turn the scale at well over 1,000 tons. In this country the 35-ton coach represents, roughly, the maximum figure, apart from dining and sleeping cars, and 500 tons of modern British train-weight probably contains accommodation but little short of that afforded by the 1,000-ton train on American metals. As the Gresley "Pacifics" and the Great Western "Kings" constantly prove themselves capable of handling trains well over 500 tons in gross weight on the fastest schedules without loss of time, any substantial advance in tractive power on that exerted by these engines would be so far ahead of present requirements as to be an uneconomic step.

Another American difficulty, necessitating frequent and severe reductions of speed by fast trains, arises from the comparative infrequency of bridges and the "open" character of the lines, as compared with those of Great Britain. Crossings at "grade," not only of roads but of other railways, are numerous, and even on so important a main line as that of the New York Central from New York to Chicago, passage up the main street of a city, at a funereal pace, is not unknown, as was brought home so forcibly by the illustration in the December issue of the "Twentieth Century Limited" passing through the heart of Syracuse. The American locomotive must therefore

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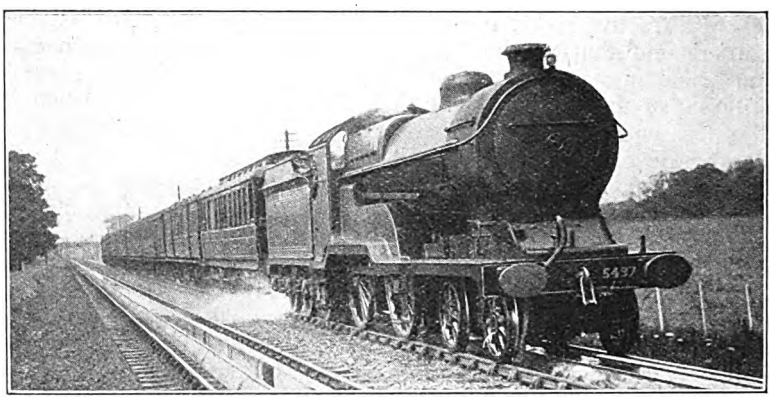

Photo.] [*H. Gordon Tidey.*

MANCHESTER-SHEFFIELD-LONDON EXPRESS L.N.E.R.

4-4-0 No. 5437 *Prince George.*

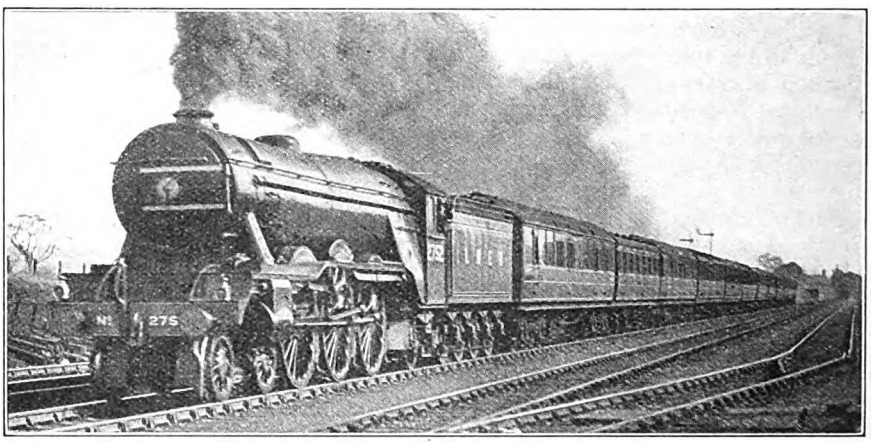

Photo.] [*F. R. Hebron.*

UP LEEDS & BRADFORD EXPRESS, NEAR POTTERS BAR, L.N.E.R.

4-6-2 No. 2752 *Spion Kop.*

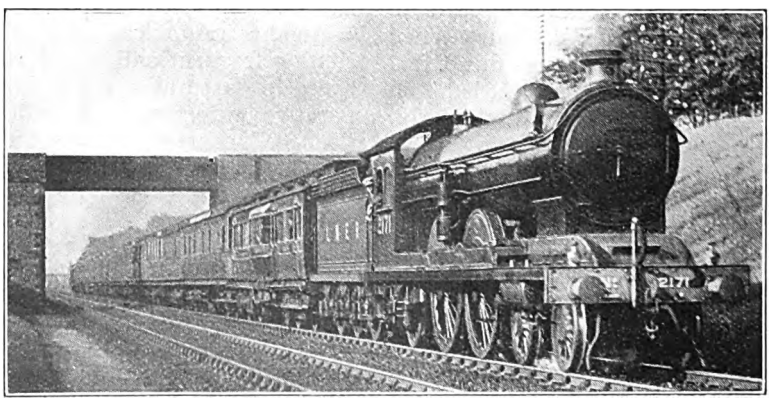

Photo.] [*F. R. Hebron.*

GLASGOW-LEEDS EXPRESS (WITH DYNAMOMETER CAR), L.N.E.R.

4-4-2 No. 2171.

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be of sufficient power to accelerate rapidly, with trains of the enormous weight already mentioned, from very numerous service slacks, if a reasonably high overall speed is to be maintained, and of this running characteristic the highly interesting articles by Baron Vuillet in the November and December issues gave ample proof. In such circumstances as these the power "demand" on American railways clearly must be far greater than on British lines, with their splendid tracks—often covered for distances of 50 to as much as 100 miles without speed restrictions of any kind—and their moderately-weighted rolling stock.

At the same time, there should be no need on British railways for the costly practice of double-heading, nor, on the other hand, for thrashing, with its attendant evils of excessive coal consumption and maintenance costs. Experience on the London and North Eastern Railway, to which both my correspondents have drawn attention, has abundantly proved the economic value of looking ahead, and of providing locomotive power in excess of normal requirements, rather than power only just equal, or barely equal, to maximum demands. I mentioned in my December article that the "Pacifics" are handling, over the Waverley route, loads nearly 40 per cent. in excess of those hitherto hauled by the North British "Atlantics," but on, roughly, the same coal consumption. On the Great Eastern section even more striking results have been obtained by the substitution of the 3-cylinder "Sandringham" class 4-6-0 engines for the well-known Great Eastern 2-cylinder engines of the same wheel arrangement.

At one shed, responsible for finding engine power for the hardest duties of the Great Eastern section, a stud of three of the larger and more powerful "Sandringham" locomotives, in comparison with three of the previous type, has brought coal consumption down by 15 per cent. The disparity would have been even greater, but for the fact that the three Great Eastern 4-6-0 engines included one fitted with Lentz valve motion, whose coal consumption was just over 9 per cent. less than that of the other two. There is no doubt, indeed, that the progressive locomotive policy pursued by the London and North Eastern Railway locomotive authorities has been largely instrumental in securing the materially improved financial position of the London and North Eastern Railway in the past year.

The running of the Great Eastern engines quoted is almost exclusively on extremely heavy trains, tightly timed over difficult gradients, with numerous intermediate service slacks. I received recently from another correspondent details of a run with No. 2805 on the "Flushing Continental" from Liverpool Street, wherein the loss of time occasioned by a dead stop for signals at East London Junction, signal checks thence to Stratford, and a bad relaying check near Manor Park, was easily recouped, the complete run to Parkeston Quay being made in 83½ min., instead of the scheduled 85 min. From Shenfield to Manningtree the 39¼ miles were run in 37 min., including Colchester slack, with a 9-coach train weighing about 340 tons, and the whole of this length was covered with the cut-off at 15 per cent. and only the first port of the regulator open. Up Brentwood Bank 24 per cent. cut-off and full regulator sufficed to maintain a minimum speed of 30 m.p.h. As showing that the power output of these engines is still well within maximum demands, it may be mentioned that on this and the much heavier "Hook Continental" and "Antwerp Continental" workings, this locomotive achieved a mileage of 6,558 in a single month—a figure which may well make even some of the "Pacifics" look to their laurels!

For the performance section of this month's article, as illustrating the work of the most powerful express locomotive type of the London Midland and Scottish system, I have a series of runs by the "Royal Scot" express from Crewe over Shap Summit to Carlisle, headed in all cases by locomotives of the "Royal Scot" type; and these runs, I may add, are a considerable improvement in character over the last corresponding series that appeared in these columns. It will be seen that in all cases but one time was kept or improved on, with loads mounting ultimately to one of 475 gross tons, and that

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L.M.S. "ROYAL SCOT" EXPRESS: CREWE—CARLISLE.

Distance.	Engine : 3-cyl. 4-6-0 No.	Schedule.	6132 *Phœnix.*	6115 *Scots Guardsman.*	6100 *Royal Scot.*	6135 *Samson.*	6109 *Royal Engineer.*	Schedule.	6128 *Meteor.*
	,, Name :								
	Load (axles) ..		42	50	50	54	54		64
	,, (tons tare) ..		292	351	354	381	381		443
	,, (,, full) ..		305	370	370	400	400		475
miles.		min.	m. s.	m. s.	m. s.	m. s.	m. s.	min.	m. s.
0·0	CREWE	0	0 00	0 00	0 00	0 00	0 00	0	0 00
4·8	Minshull Vernon ..	—	7 55	7 35	—	8 00	7 30	—	8 10
8·7	*Winsford Junction*	11	11 40	11 05	12 00	11 45	11 20	11	11 50
14·4	Acton Bridge ..	—	16 50	15 55	17 10	16 38	16 50	—	16 35
16·2	*Weaver Junction* ..	18	18 30	17 35	18 45	18 11	18 40	18	18 05
21·2	Moore	—	23 15	22 20	23 34	22 39	24 15	—	22 30
24·0	WARRINGTON ..	27	25 50	25 00	26 14	25 08	27 25	27	25 00
27·5	*Winwick Junction*	31	29 25	28 45	30 15	28 30	31 30	31	28 20
29·8	*Golborne Junction* ..	—	32 10	31 40	33 12	31 05	34 30	—	30 55
				sigs.					
35·8	WIGAN	41	38 50	39 30	40 13	37 52	41 20	41	37 15
38·0	Boar's Head ..	—	41 50	42 35	43 09	40 48	44 10	—	40 05
39·1	Standish Junction	45	43 25	44 15	44 50	42 38	45 40	45	41 30
41·6	Coppull	—	46 45	47 45	48 25	46 30	49 10	—	44 50
45·5	*Euxton Junction* ..	53	50 25	51 15	52 03	50 26	52 50	53	48 20
48·6	Farington	—	53 40	54 05	54 50	53 36	55 50	—	51 10
									sigs.
50·9	PRESTON ..	60	56 25	56 55	57 28	56 16	58 55	60	54 30
									sigs.
52·2	*Oxheys*	63	58 50	59 30	60 05	60 00	61 30	—	59 05
55·7	Barton	—	63 10	63 45	64 34	63 38	65 55	—	63 55
			p.w.s.						
60·4	Garstang	71	69 45	68 05	69 18	68 31	70 45	72	68 35
				p.w.s.			p.w.s.		
66·2	Bay Horse ..	—	75 50	75 15	75 13	74 29	79 35	—	74 05
70·8	*Lancaster Junction*	—	80 30	80 05	80 14	79 23	84 55	—	78 55
71·9	LANCASTER ..	83	81 35	81 05	81 18	80 16	86 00	86	81 25
			sigs.						
75·0	Hest Bank ..	—	85 00	84 05	84 16	82 51	89 20	—	5 35
78·2	CARNFORTH ..	89	88 35	87 00	87 28	85 46	92 25	9	9 05
82·7	Burton	—	93 45	91 55	92 25	90 50	97 20	—	14 20
85·5	Milnthorpe ..	—	96 35	94 45	95 15	93 39	100 15	—	17 10
					p.w.s.				
87·4	*Hincaster Junction*	—	98 35	97 05	—	—	102 20	—	19 20
91·0	OXENHOLME ..	104	103 10	102 10	105 21	101 34	107 10	25	24 20
94·5	*Hay Fell*	—	108 25	107 30	—	—	112 20	—	29 50
			p.w.s.	p.w.s.			p.w.s.		
98·1	Grayrigg	—	115 15	113 40	118 53	114 33	119 30	—	36 35
99·8	Low Gill	—	117 40	116 20	—	—	122 00	—	39 10
104·1	TEBAY	121	122 10	121 00	125 25	120 57	126 40	42	43 40
107·1	*Scout Green* ..	—	—	125 00	—	—	130 55	—	47 45
109·6	*Shap Summit* ..	132	131 50	131 05	134 28	132 03	137 00	53	53 45
111·6	Shap	—	134 30	133 55	137 00	134 40	139 45	—	56 40
118·9	Clifton	—	141 30	141 45	143 19	141 08	146 50	—	63 30
123·1	PENRITH ..	146	145 45	145 50	147 10	144 45	151 25	67	67 30
127·9	Plumpton ..	151	151 15	150 30	151 31	149 04	155 55	72	72 45
133·6	Southwaite ..	—	156 30	155 45	156 04	153 56	160 40	—	78 05
136·1	Wreay	—	158 50	158 05	158 06	155 56	162 50	—	80 20
141·0	CARLISLE ..	164	164 10	163 25	163 23	160 44	169 00	86	85 50
141·0	Net times (min.)	164	160½	159	160¾	160¾	166	86 86	79 85¾

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despite various delays *en route*. It should also be noted that on the second, third, fourth and fifth runs the engine had worked through from Euston, bringing down to Crewe nearly 100 gross tons of train-weight more than that handled forward from Crewe to Carlisle. On the last run, which was, in view of the load, considerably the most noteworthy of the series, *Meteor* was running through on the "Midday Scot" from Crewe to Glasgow, and so still had Beattock Summit in prospect after negotiating the 915 feet altitude of Shap. The first, second and fifth runs are of my own timing; the third and fourth came from a correspondent, and the last run was sent me by two independent correspondents, both of whom, unbeknown to each other, "logged" the same train, and, furthermore, gave me two sets of figures in very close agreement.

The first run in the table was not strictly a "Royal Scot" journey, but was made on the Perth express immediately following, during the summer season when the "Scot" herself was running non-stop to Kingmoor. Such a load was, of course, a very easy proposition for a "Royal Scot," and there was nothing of note about the running, speeds being 65 m.p.h. at Winsford Junction, 70½ at Moore, 47½ at Golborne Junction, 60 at Bamfurlong, 39 at Boar's head, 69 at Balshaw Lane, not above 61½ at Galgate, 61 at Carnforth, 50 at Burton, 60 at Milnthorpe, 44 at Oxenholme, 34 before the p.w. slack on the upper length of Grayrigg bank, and 26½ at Shap Summit, after which we ran in very leisurely fashion down to Carlisle. Slacks to 55 m.p.h. were made through Weaver Junction, Warrington and Euxton Junction, while we had permanent way checks at Barton, beyond Lancaster, below Grayrigg, and a slight one before Penrith. Time was just kept, but this was an undistinguished run.

In the second column, *Scots Guardsman*, with 370 tons, made an excellent start out of Crewe, attaining 70½ m.p.h. at Winsford Junction and before Weaver Junction, where again we slacked to 55 m.p.h., and a third "70" was noted at Moore troughs. We breasted Acton Grange Viaduct at 61½ m.p.h., but slowed to 55 for Warrington, and then, after clearing Golborne Junction at 45 m.p.h., there came a bad signal check at Bamfurlong. We passed Wigan at 50½ m.p.h., climbed to Boar's Head at a minimum of 37, attained 45 at Standish and cleared Coppull Summit at 41, after which we attained 71½ an hour at Balshaw Lane and 69 at Farington, with an intervening slack to 55 over Euxton Junction. After slowing to 25 an hour through Preston, we were going splendidly at Garstang, maintaining 69 m.p.h. on the level, when there came a bad p.w.r. check at Bay Horse. After this we touched 65 m.p.h. through Lancaster, 66 at Hest Bank, 65 at Carnforth, fell to 48½ up to Burton and reached 60 at Milnthorpe, passed Oxenholme at 39 and were doing 37½ steadily up the upper part of Grayrigg when we were pulled up to 25 for the relay check. Attaining 60 at Dillicar troughs, we mounted to Shap Summit at a leisurely minimum of 22½ m.p.h., and then went very easily down to Carlisle, which we reached with ½-min. still in hand.

On the next two runs my correspondent does not mention more than a few of the principal speeds noted *en route*. *Royal Scot*, with 370 tons, made a normal run, the chief minimum speed being 27 m.p.h. at Shap Summit, after which a fast descent to Carlisle sufficed for bare timekeeping. Net time on this run was 160¾ min., allowing for 2¾ min. loss by the p.w. check after Milnthorpe. The fourth run, behind *Samson*, was notable by reason of considerably faster travelling than on the other trips over Weaver Junction, through Warrington and Lancaster, and particularly from Shap Summit down to Carlisle, where the speed at Clifton Junction reached 83 m.p.h. The time of 3 min. 37 sec. from Clifton to Penrith was an unusual one. *Per contra*, the uphill work, even with 400 tons, was not so good, as is evidenced by such speeds as 35 m.p.h. at Boar's Head, 46 before Burton, 32½ at the bottom and 31½ at the top of the 1 in 106 which forms the culmination of Grayrigg Bank, and 20½ an hour at Shap Summit. Nevertheless, by the high downhill speeds run below Shap the driver succeeded in cutting booked time to Carlisle by 3¼ min.

My run with *Royal Engineer*, in the

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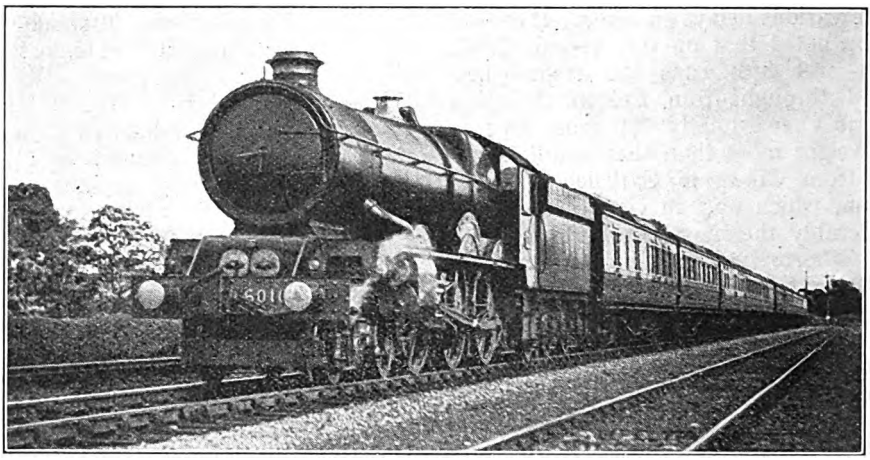

Photo.] [*F. R. Hebron.*

BIRMINGHAM, BRISTOL AND PLYMOUTH EXPRESS NEAR TAUNTON.

4-6-0 No. 6010 *King Charles I.*

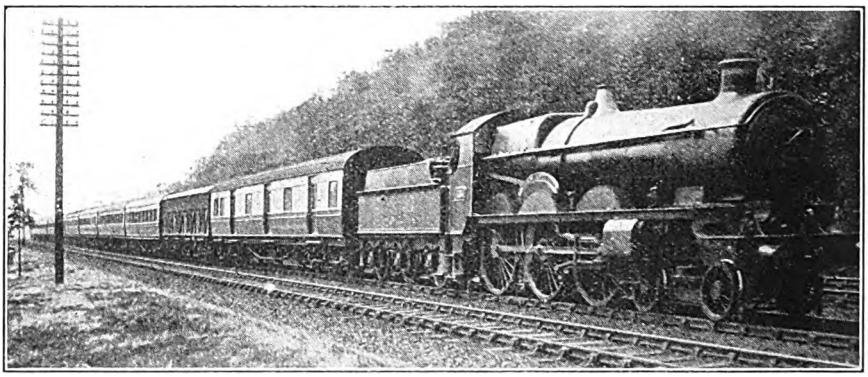

Photo.] **UP OCEAN MAIL SPECIAL NEAR TWYFORD.** [*J. Dearden.*

4-6-0 No. 4034 *Queen Adelaide.*

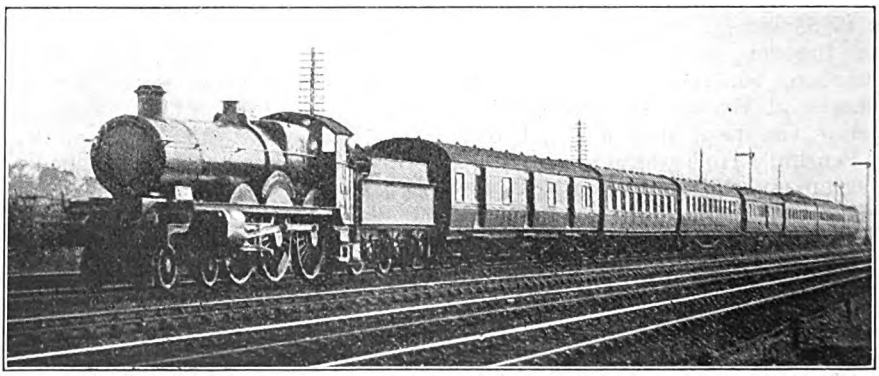

Photo.] **UP OCEAN MAIL EXPRESS FROM PLYMOUTH.** [*M. W. Earley.*

4-6-0 No. 4018 *Knight of the Grand Cross.*

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fifth column, was the poorest effort in the table. We were 2 min. late into Crewe, but the station staff there, with their usual energy, cut their station allowance correspondingly, and saw us off the premises to time. Yet after a brisk start to Winsford Junction, the engine travelled with unaccountable sluggishness over the falling grades to Moore (though even so only running a shade behind time to Standish), and so was well behind the other runs in time through Preston. Speeds were as low as 45 m.p.h. at Acton Grange, 44 at Golborne Junction and 40 at Boar's Head. After Lancaster there was a belated improvement, with speeds of 65 m.p.h. at Carnforth, 47½ at Burton, 60 at Milnthorpe, 49 at Hincaster Junction, and from 40 to 38 maintained up Grayrigg Bank from Peat Lane to the point, well up the 1 in 106, where we were slowed for the p.w. operations, after which we accelerated on the same grade from 20 to 28 m.p.h. But Shap incline brought us down from 60 an hour (at Tebay) to 23½ m.p.h., and after that we went down to Penrith as though the whole day were still before us, even losing a shade of time over this length, speed being actually kept down at one point on the 125 to 55 miles an hour! A maximum rate of 77½ m.p.h. at Southwaite came too late to help matters much, and we reached Carlisle 5 min. late, of which at least 2 min. must go against the engine.

Chief honours in the table go easily to the engine *Meteor*, whose run, in the last column, was a very fine performance. It is significant, also, that a Scottish driver —Donald, of Polmadie—was in charge on the footplate. Speed crossed the "sixty" line soon after Minshull Vernon, and averaged 72 from Winsford Junction to Hartford. I think, however, that the 78 m.p.h. near here quoted by one of the two recorders on the train is a little on the high side ; it is possible that he was misled by the rail-lengths at this point, which have the acoustic effect of 60-ft. rails, but are actually well under that figure. The same phenomenon may be noticed on the up road between Blisworth and Roade Cutting, and at certain other locations ; the effect is, of course, to "boost" the speed unduly, if the recorder is estimating by rail-joints.

Speed was 72½ m.p.h. at Moore troughs, 64½ over Acton Grange Viaduct, excusably, perhaps, higher than usual through Warrington and still 61 at Winwick Junction, after which it fell to 49½ at Golborne Junction and recovered to 62 at Bamfurlong. The lowest rate up Boar's Head bank was 39 m.p.h., and speed then rose to 71 m.p.h. at Balshaw Lane and 68½ through Farington, before the slight signal check which heralded the approach to Preston. Apart from this, Donald would have cleared Preston in the excellent time of 54 min. from Crewe, 475-ton train notwithstanding. There was a severe signal check after Preston, but once through Barton, *Meteor* maintained from 62 to 64½ m.p.h. throughout the level stretch beyond, and despite the two signal checks succeeded in regaining 4½ min. to Lancaster out of the 10¾ min. of arrears on leaving Crewe. Net time for this section was 79 min., 7 min. under schedule, and better even than the net times on all the other more moderately-weighted runs, except the second.

Further time-regaining to Carlisle could hardly be expected, especially as the division of the schedule into two equal lengths of 86 min. each—from Crewe to Lancaster and Lancaster to Carlisle respectively — disproportionately favours the earlier part of the journey, which, though 3 miles shorter in distance, is vastly easier in grading. In this connection it is noticeable that on no one of the six runs was strict time kept from Carnforth to Shap Summit, though this is excusable on some runs by reason of time in hand at Carnforth and on others by the slight loss of time occasioned by Grayrigg p.w.r. check. Carnforth was passed on the last run at 56 m.p.h., and the ascent to Burton negotiated at a minimum of 44½, after which a maximum of 60 at Milnthorpe preceded speeds of 50 at Hincaster Junction, 38 at Oxenholme, and then, after a very slight recovery, 34½ at Hay Fell and 30 at Grayrigg. Far from being winded, *Meteor* then touched 60 an hour at Tebay, and went up to Shap Summit at a minimum rate of 23½ m.p.h. The time of 44 min. 40 sec. for the 31.5 miles from

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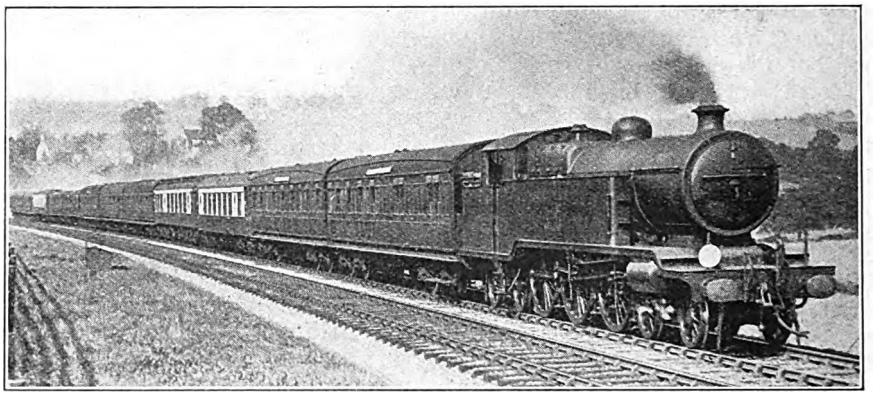

Photo.] **VICTORIA-BRIGHTON PULLMAN EXPRESS, S.R.** [*F. R. Hebron.*
4-6-4T No. B.330.

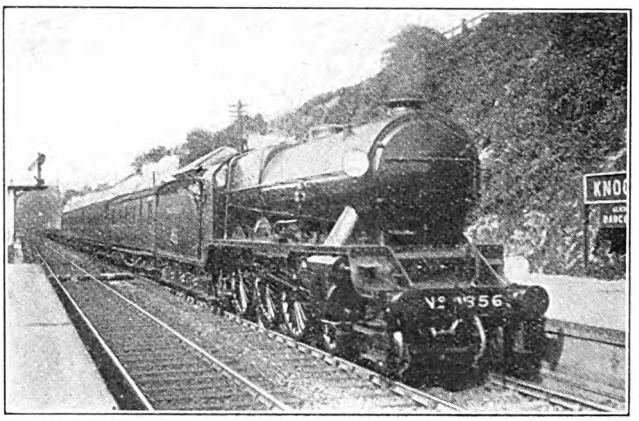

Photo.] [*L. A. Blount.*
CONTINENTAL EXPRESS PASSING KNOCKHOLT, S.R.
4-6-0 No. E.856 *Lord St. Vincent.*

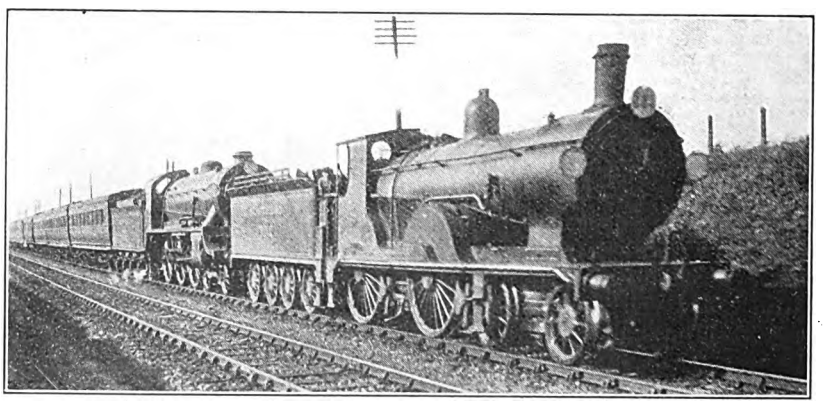

Photo.] **UP SPECIAL NEAR REDBRIDGE, SOUTHAMPTON.** [*C. E. Hawksworth.*
4-4-0 No. E.725 and 4-6-0 No. E.776 *Sir Galagars.*

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Carnforth up to Shap Summit was, with such a load as 475 tons, an exceedingly fine one.

Little need be said of the descent from Shap to Carlisle; speed was severely restrained at various points, but reached or slightly exceeded 75 m.p.h. at Clifton and Southwaite. Time was thus almost exactly kept from Lancaster to Carlisle. The continuation of this journey, with the same engine and over the driver's "native heath," must be reserved for a later occasion in the present year, when I hope to have something to say about the running over the two London Midland and Scottish main lines between Carlisle and Glasgow.

I conclude with brief details of a couple of runs, timed by correspondents, in the reverse direction. Both were made on the 175-minute timing non-stop from Carlisle to Crewe, which is shared, with identical division of the times from point-to-point, by the "Royal Scot" and "Midday Scot" expresses. "Royal Scot" No. 6115, *Grenadier Guardsman,*" with a train of 350 tons, made light of the schedule, after a late start from Carlisle, attaining 40 m.p.h. up the ascent to Wreay, which was passed in 10 min., touching 60 m.p.h. beyond Penrith (passed in 27 min. 5 sec.), and mounting the 7 miles at 1 in 125 to Shap at a minimum of 37½ m.p.h. Shap Summit was passed in 44 min. 55 sec., or a little more than 5 min. under booked time. Downhill speeds were not exceptionally high, reaching 72 an hour before Tebay, and 76½ below Oxenholme; Tebay was passed in 50¼ min., Grayrigg in 55¾ min. (which included a p.w. check on Grayrigg bank), Oxenholme in 64 min., and Carnforth in 75 min. 50 sec. There was a slack through Lancaster, which was cleared 6 min. later, 8 min. 10 sec. inside schedule. High speed was run on the level stretch from Galgate to Barton, this distance of 11.8 miles taking 10 min. 14 sec., with a maximum rate of 73½ m.p.h. So Preston was cleared in 104 min. 10 sec., or about 101 min. net—an excellent performance, the somewhat leisurely booking allowing 114 min. Standish was passed in 121 min. 25 sec., Wigan in 123¾ min., Warrington, after another slight p.w. check, in 137¾ min., Hartford in 151 min. 25 sec., Minshull Vernon in 158¾ min., and Crewe was reached in 165 min. 5 sec.—an actual cut of 10 min. on booked time. Allowing for the three checks, none of them severe, the net time was not more than 161 min.

But No. 6123, *Royal Irish Fusilier,* found no small difficulty with a load of 445 tons tare and 475 tons full on the "Midday Scot"; in this connection it should be remembered that the engine was working through from Glasgow, and had therefore negotiated the 1,015-ft. altitude of Beattock before commencing this run. By Wreay, passed in 12 min. 55 sec., speed had not risen above 25½ m.p.h.; at Penrith 53½ m.p.h. was touched, but the 1 in 125 to Shap brought the rate down to 28 m.p.h. Plumpton was passed in 27 min. (6 min. overtime), Penrith in 33 min. 25 sec., Clifton in 38 min. 40 sec., Shap in 53 min. 5 sec., and Shap Summit in 56 min. 35 sec., 6½ min. behind time. There were some robust downhill speeds to follow, including 80½ an hour before Tebay, 54½ minimum at Grayrigg, 72 at Oxenholme and 70½ at Milnthorpe, 54½ minimum at Burton and 67 at Carnforth. Resulting times were 61¾ min. to Tebay, 67½ min. to Grayrigg, 73 min. 40 sec. to Oxenholme, 78½ min. to Milnthorpe, and 85 min. 25 sec. to Carnforth, where the train was now only 2½ min. behind time. But there were unfortunate signal checks at Hest Bank and Galgate, and the speed did not rise above 58 m.p.h. on the tempting stretch to Oxheys, so that the times of 92¾ min. to Lancaster, 108½ min. to Garstang, and 119¾ min. to Preston had brought the running back to 5¾ min. overtime. There was a further loss of a minute to Euxton Junction (128 min. 50 sec.); and yet another was dropped to Standish, which was passed in 137 min. 40 sec., after a minimum of 36 m.p.h. at Coppull Summit; Wigan was cleared in 141 min., 7 min. late, Warrington in 152 min. 55 sec., 6 min. late, Weaver Junction in 161 min. 50 sec., Winsford Junction in 170 min. 5 sec., and Crewe was reached in 180 min. 50 sec., nearly 6 min. late. Speeds were 64½ m.p.h. at Wigan, 52 at Golborne, 64½ at Winwick Junction, 48½ at Acton Grange, 58 at Moore troughs, 45 at Weaver Junction and 58½

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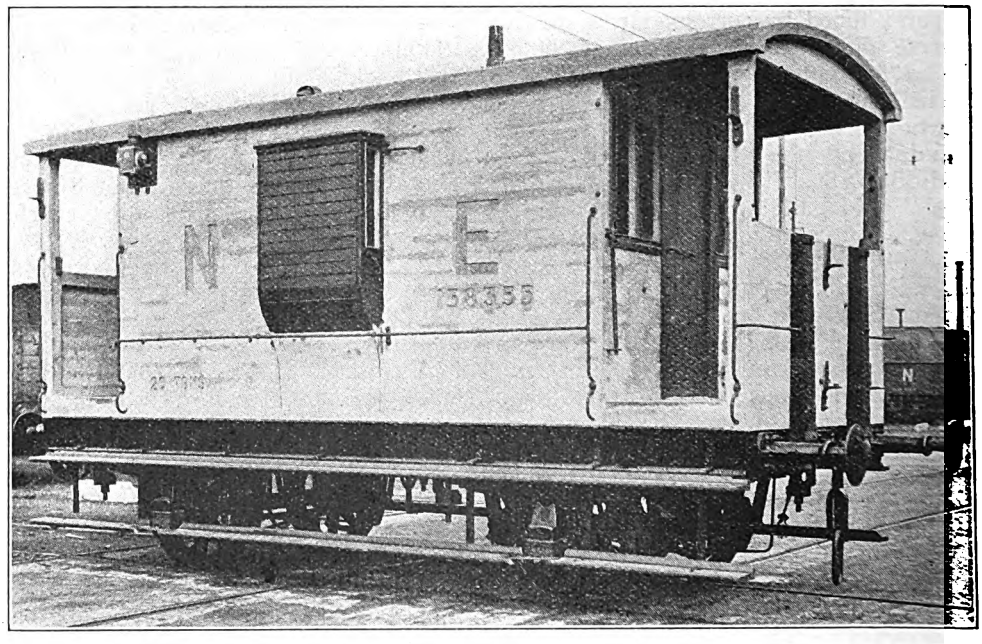
at Winsford Junction. The driver thus held his own from Preston to Crewe, but the two checks, coupled with the initial loss of 2½ min. to Carnforth, were more than could be regained. It was a plucky effort, with such a load as this, but it would appear that, save under exceptional circumstances of driving competence, the "Royal Scots" have not much in hand on these bookings over Shap when the load is much in excess of 400 tons.

For letters received during the past month I must tender thanks to W. T. Marshall, R. D. N. Oldrey, C. L. Cleaver, A. Davidson, F. A. Hudson, C. C. Mount, "Exhaust," and "Coisde Teineadh."

20-TON GOODS BRAKE VAN WITH FERRO-CONCRETE BODY, L.N.E.R.



A goods brake van with a body constructed of ferro-concrete has been turned out from the London and North Eastern Railway shops at Temple Mills to the design of Mr. H. N. Gresley, C.B.E., the Chief Mechanical Engineer.

The usual wooden body has been replaced by a structure of reinforced concrete, the design of which was prepared in conjunction with K. Holst & Co., of Victoria Street, S.W., who have also carried out the actual work of construction in the London and North Eastern Railway shops. The weight of the concrete is such that the full tare can be obtained without fitting the usual cast-iron ballast weights.

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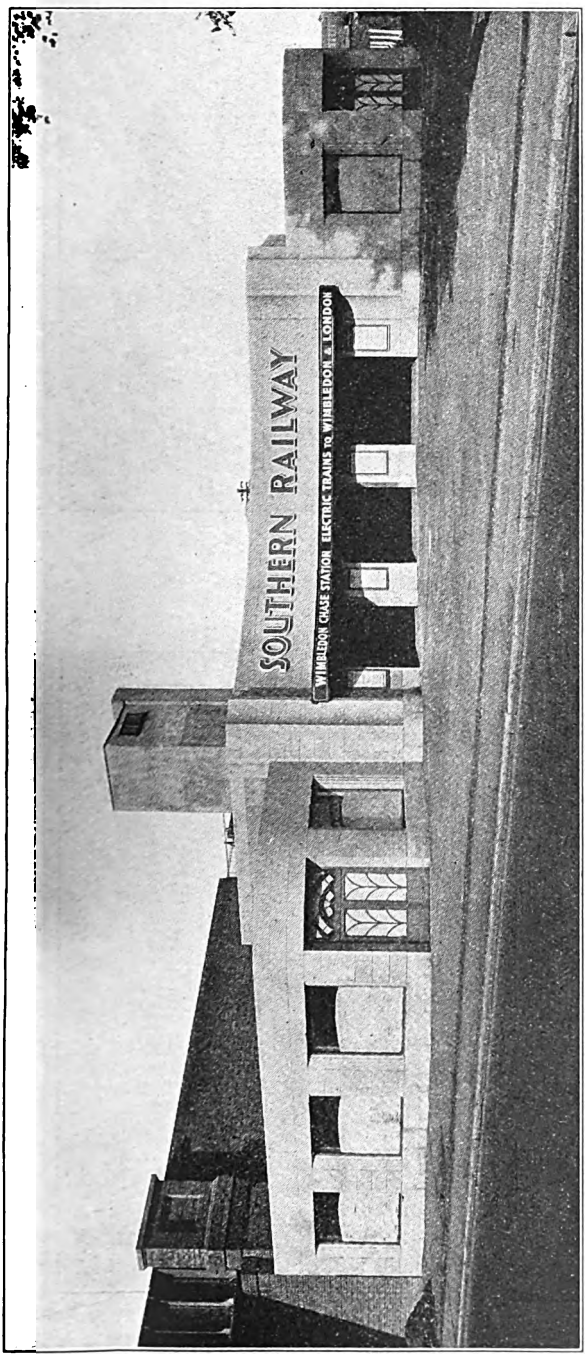
New Wimbledon and Sutton Line, Southern Railway.



THE new railway is $5\frac{1}{4}$ miles long, and although work at the Wimbledon end was commenced by the Southern Railway staff in October, 1927, the major portion, consisting of 4 miles of track, has been constructed by Sir Robert McAlpine's firm in the record time of approximately 18 months. The work has been arduous, especially at the Sutton end, where a treacherous vein of blue clay has necessitated intensive drainage being installed and deep cuttings through chalk strata. Over half a million tons of earth had to be excavated for the cuttings, and this was used to form the banking of the Wimbledon-Morden South portion. The cuttings where practicable have been sown with grass seed, and now present a very pleasing appearance.

The chief bridges, starting from the Wimbledon end, go over or under the following thoroughfares:—

Toynbee Road.
The Chase.
Kingston Road (Main Portsmouth Road).
Whatley Avenue.
Cannon Hill Lane.
Green Lane, Merton.
Hatfields Road.
London-Worthing Road.
Central Road.
Green Lane, Morden.
Love Lane.
Sutton By-Pass.
Sutton Common Road.
Stayton Road.
Collingwood Road.
Norman Road.
Tate Road.
Cheam Road.
Grove Road.

Some notable features of the track are the high banking

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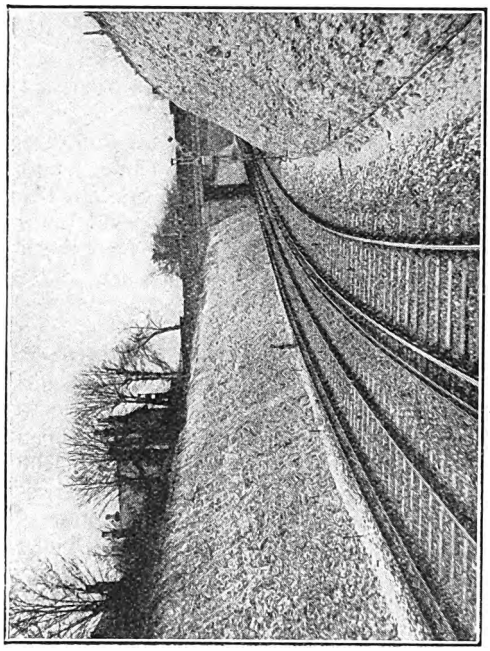
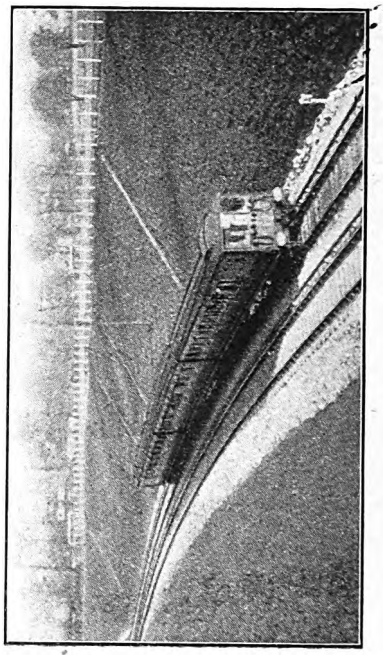
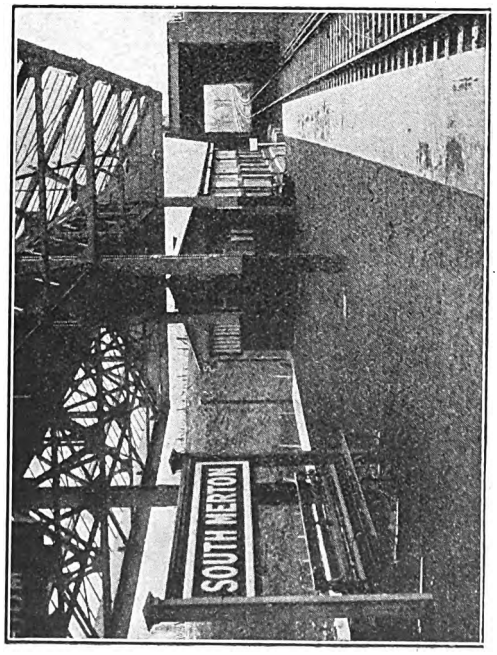


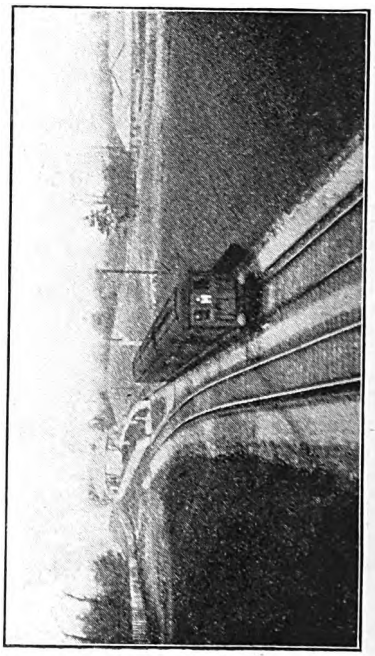
CHALK CUTTING NEAR WEST SUTTON. [*Topical.*



IN CUTTING NEAR ST. HELIER. [*R. W. Airy.*



Photos.] SOUTH MERTON STATION.



Photos.] TRAIN LEAVING MORDEN SOUTH.

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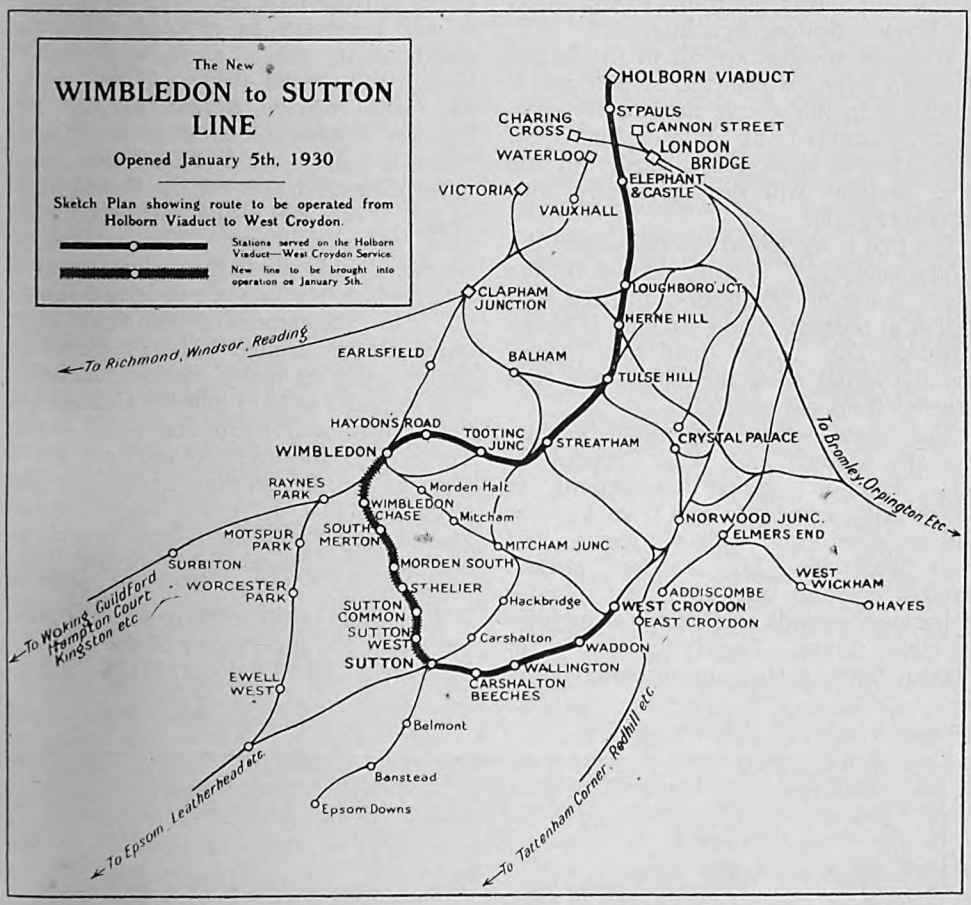
necessary to carry an abnormal number of bridges over the various roadways. No fewer than 24 over- and under-bridges have been built, including three footbridges, but—there are no tunnels and no level crossings! The over-bridges are all of reinforced concrete and the under-bridges of steel girders with concrete floors, the longest span being that over the London-Epsom Road, which measures 120 ft.

The high banking and numerous bridges have helped to make the construction of this railway a comparatively expensive undertaking. The bridges themselves have had to carry any number of public service pipes and cables and the cost of drainage has also been very high. Disturbance of property figures very largely in a bill of this nature, and the total cost is a little over a million pounds. The whole of the contracts in connection with the building of this line have been placed with British firms.

There are six new stations. Wimbledon Chase and South Merton have been open for some time, and have already proved a great boon to the residents in the rapidly growing locality served by them. Then come Morden South, St. Helier, Sutton Common and Sutton West. St. Helier makes a special appeal, as it is here that the London County Council have decided to build their new town of about 10,000 houses. The Sutton Council, too, have a big building scheme which will be served by the two new stations at Sutton Common and Sutton West. Passimeter booking offices have



SKETCH MAP SHOWING ALSO CONNECTIONS WITH OTHER RAILWAYS AND ROUTE OF THROUGH SERVICE.

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been installed at all these stations, those at Wimbledon Chase, St. Helier and Sutton West being placed in the station buildings and those at the other stations forming passimeter entrances to the platforms. Wimbledon station has been adapted to allow trains to pass through to St. Paul's, Holborn Viaduct, &c., *via* Tooting Junction, and the junction at the Sutton end allows the trains to run in on the Epsom, Sutton, &c., line.

The new stations are all of the Island Platform type, whilst the station architecture is in the simple modern style, so greatly admired at Wimbledon. St. Helier has a large goods yard, but the other stations will deal primarily with passenger traffic.

The line is electrified throughout on the "direct-current" system, served by the power house at Wimbledon and the substation at Sutton. The signalling is of the "two-position upper quadrant" type, and the signal posts themselves are constructed from old steel rails.

The train service operates between Holborn Viaduct and West Croydon in each direction, giving connections at Sutton with services to and from Victoria and at Wimbledon with services to and from Waterloo. The standard electric services operate, viz., every 20 minutes at business periods and every 30 minutes at other times. The trains consist of 8-coach units, each train accommodating 112 first-class and 540 third-class passengers. Cheap weekly, monthly and quarterly season tickets to town, &c., will be available, as well as the usual cheap day return tickets.

The new line serves a district which has already been developed to some extent, in that there are a considerable number of houses which will now have direct railway facilities, whereas formerly it was necessary to proceed substantial distances to reach a railway station, though the special value will be that the line will provide access to the new London County Council housing estate which is being erected at St. Helier, while other districts traversed by the 5¼ miles length of line will also be rendered available for development. The route is, of course, double track throughout, and all intermediate stations are of island design, built to accommodate standard eight-coach electric trains. The gradients are fairly heavy on many sections, including 1 in 49 and 1 in 44 to join the Central Section Portsmouth main line near Sutton. There are, however, other sections as steep as 1 in 60, so that, speaking generally, the line is much more steeply graded than would have been practicable had it been intended to operate it by steam trains.

The whole of the work has been carried out under the supervision of the Southern Railway's Chief Engineer, Mr. G. Ellson.

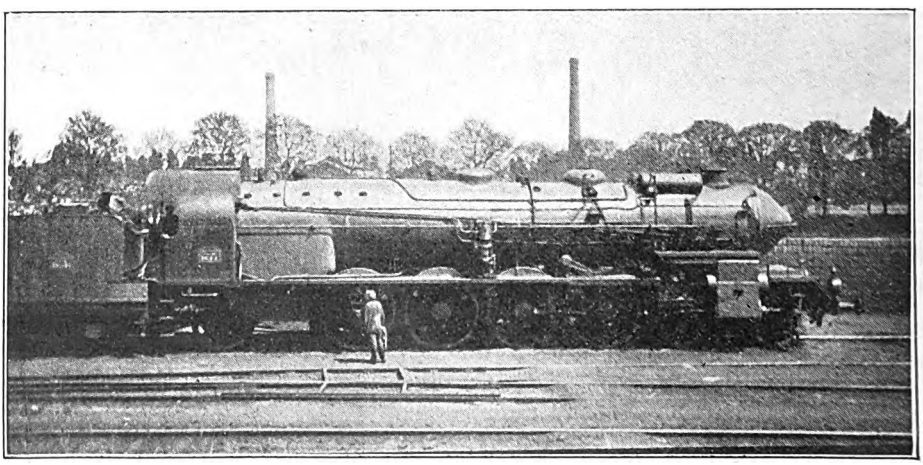

Photo.] [*Lord Monkswell.*

P.L.M. FOUR-CYLINDER COMPOUND 4-8-2 LOCOMOTIVE.

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The Main Line Gradients of British Railways.

XIV.—LONDON MIDLAND & SCOTTISH RAILWAY, NORTHERN DIVISION; MAIN AND BRANCH LINES, HIGHLAND SECTION.

By "VOYAGEUR."

OVER the main routes of the Highland section of the L.M.S. the amount of actual express running—which is, strictly, the qualification governing the selection of routes for profiling in this series—is very limited. Extremely lengthy and severe gradients, especially those through the heart of the Grampians, and long stretches of single line, combine to enforce liberal timings, even in the case of the important trains which make but few publicly-scheduled stops. Furthermore, the effect of comparatively long distances between passing-places is to compel the assembly of very heavy trains rather than to increase their number, adding yet more to the difficulties of working, from the locomotive point of view. Some of this increase of weight, so far as concerns the night trains—which, northbound in the early morning and southbound in the afternoon and evening, provide the chief haulage problem on the Highland main line between Perth and Inverness—is, however, attributable to the popularity of the recently-introduced third-class sleeping cars. Numbers of these vehicles, both first and third class, and of both L.M.S. and L.N.E. Companies' stock, are found in these night expresses, every one of which also carries either a Pullman or a London Midland and Scottish restaurant car. Incidentally, restaurant cars are worked daily as far north as Helmsdale, and during the summer season, on Fridays from Inverness and on Saturdays back again, the "Farther North Express" carries its restaurant car train through to Wick.

PERTH TO INVERNESS

(Sheets 28 and 29).

As far as Stanley Junction the Highland trains follow the Caledonian main line to Aberdeen, but at Stanley the Highland line branches to the northwards, and the Highland mile-posts are actually measured from zero at Perth. Single-line working begins at once, and continues from Stanley through to Blair Atholl, a distance of 28 miles. Thence, in order to reduce the congestion which would be caused, apart from short block sections, on the heavy climb through the fastnesses of the Grampians, the line has been doubled from Blair Atholl over Druimuachdar, or, as it is, perhaps, better known, Drumochter Summit, to Dalwhinnie, 23¼ miles farther on. From there single line persists to Dalcross, 6¾ miles from Inverness on the old route from Aviemore through Forres, and to Daviot, 11 miles from Inverness on the direct route *via* Carr Bridge and Slochd Mhuic Summit. It may be added, however, that the lay-out of the crossing-places between Perth and Inverness has been so superbly done that, coupled with the automatic exchange of single-line tokens, it imposes no reduction of speed on express trains other than a purely nominal one. The writer has, indeed, known some of these passing-places taken with safety and perfect smoothness at speeds up to 60 m.p.h. Even through the mountains, too, the alignment of the track has been excellently carried out, there being but few curves between Perth and Inverness of a sharper radius than half a mile.

The main line, which is mostly on rising grades to Stanley Junction, continues to climb thence at 1 in 93, and after a short descent to Murthly, further for 2 miles mostly at 1 in 82, to Kingswood crossing, ere it drops at 1 in 80 for 2 miles, for the most part sharply curved, through what is sometimes known as the "Gateway of the Highlands," to the valley of the Tay at Dunkeld. After reaching the bottom of

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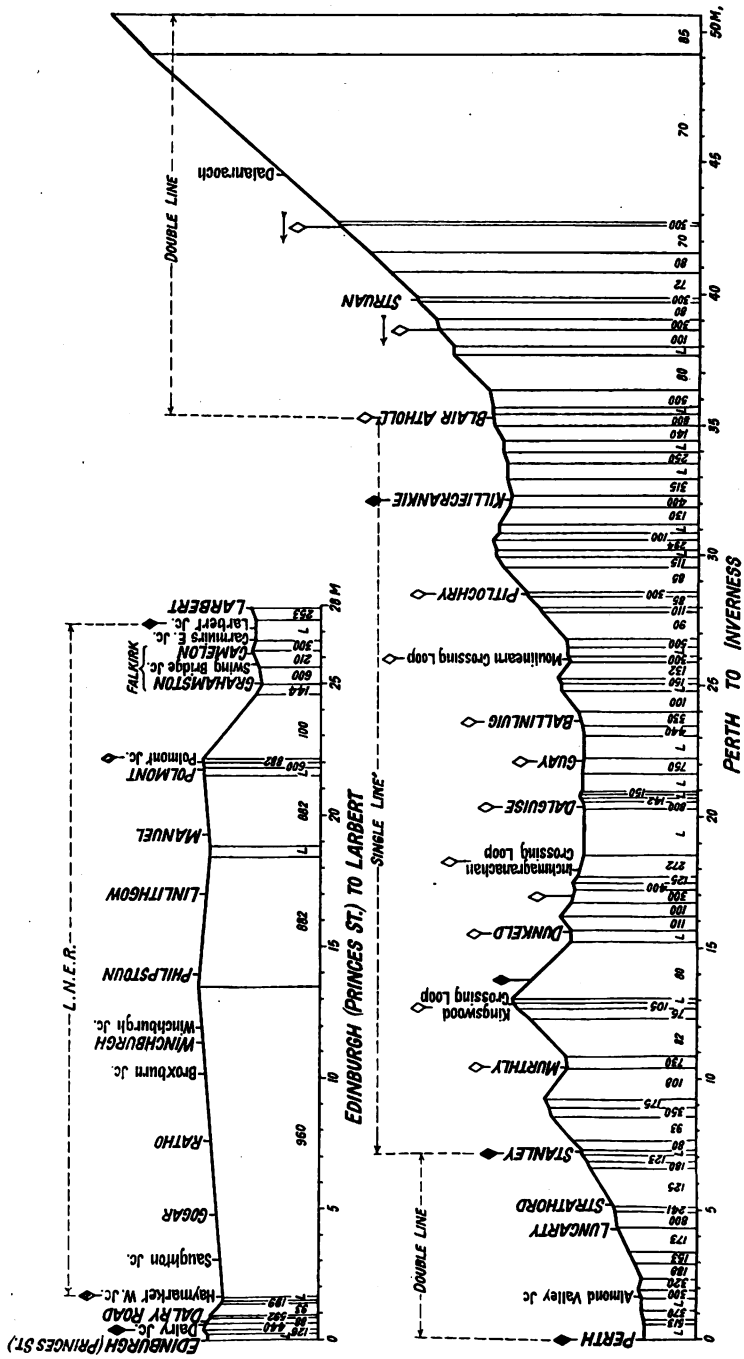

SHEET 28.—GRADIENT PROFILES, LONDON MIDLAND & SCOTTISH RAILWAY.

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the valley at Inchmagranachan, the line continues fairly level to Ballinluig—the junction for Aberfeldy—where it leaves the Tay valley, first for that of the Tummel, but after Pitlochry striking up Glen Garry. Past Pitlochry there is a 3-mile climb, mostly at 1 in 85-90, ushering in a second level section, from mile-post 30½ to mile-post 36½, a mile beyond Blair Atholl. The Grampian climb now begins in earnest. Up to Struan Station, the 3½ miles at 1 in 100-80 include three short level breaks aggregating a mile in length ; but from mile-post 40 the climbing is unbroken, for 1¾ miles at 1 in 72-80, and then for 7½ miles at 1 in 70, 1½ at 1 in 85 and ¼ mile at 1 in 140. A level ¾ mile past Dalnaspidal Station precedes the final 1½ miles to Druimuachdar Summit, mostly at 1 in 78. The climb from 36½ miles to the summit at mile-post 53 is thus 16½ miles long, of which 13½ miles are at 1 in 85 or steeper, and 9½ at 1 in 78-70. Altogether, 21 out of the first 53 miles facing the engines of down Highland trains from Perth are at 1 in 100 or steeper, and they carry the trains to the highest summit attained by any railway in Great Britain, at an altitude of 1,484 feet above the sea.

The north ascent to Druimuachdar is, as will be seen, considerably easier than the south side in its immediate approach from the Spey Valley ; the difficulties on this side lie considerably farther on. Over the 15¾ miles down to Newtonmore there are but 4 miles as steep as 1 in 80, and just over 6 at 1 in 95 or 100 ; from there the line undulates, with a falling tendency, down the Spey Valley to Aviemore. Here the "Direct" line leaves the old Forres line, and in the remaining 34¾ miles to Inverness there are concentrated the worst grades of the journey. The "ruling" gradient now steepens to 1 in 60. There is first the climb past Carr Bridge over Slochd Mhuic Pass, 1,315 feet above the sea, separating the Spey Valley from that of the Findhorn. This ascent includes 2 miles at 1 in 100-92, 3½ at 1 in 75-70, and 2½ miles at 1 in 60 ; and the subsequent descent is for 3¼ miles at 1 in 60. Sharp undulations follow from the 98½ to the 105 mile-post, with a falling tendency. Last of all there comes the fearsome descent to Inverness, 12¾ miles long, for 10¾ miles of which the 1 in 60 grade persists throughout, with 2½ miles at 1 in 70, and the remainder easier. There is a short "breathing-space" of ¾-mile down, across Culloden Moor, where the line rises out of Strath Nairn, favourable to southbound trains, right in the middle of their ascent. In plan the Highland main line makes a tremendous loop from Daviot to Inverness, designed to ease the gradient, 11 miles of track being needed to span what, in a straight line, is a distance of just under 5½ miles. No more difficult route could be found in the British Isles than this. The two most important engineering features of the Highland main line are found on the direct line between Aviemore and Inverness. Near Tomatin the Findhorn Valley is crossed by a steel viaduct of nine 130-ft. spans, 1,335 ft. in total length, and of a maximum height of 140 ft. Even bigger is the viaduct of 29 arches across Strath Nairn, near Culloden Moor. The total length of this masonry structure is 1,785 ft., and the maximum height 130 ft.; all the arches are 50 ft. span save the central one across the river, which spans 100 ft.

DISTANCES.

Mile-posts, down side, Perth to Stanley Junction (from zero at Carlisle), and down side, Stanley Junction to Inverness (from zero at Perth).

	Miles.
PERTH (GENERAL)	0·0
Almond Valley Junction (up)	1·6
Luncarty	4·2
Strathord	5·1
STANLEY JUNCTION	7·2
Murthly	10·3
Kingswood Crossing (up)	12·9
DUNKELD	15·6
Inchmagranachan Crossing South (up)	17·8
Inchmagranachan Crossing North (down)	18·2
Dalguise	20·4
Guay	21·5
Ballinluig	23·6
Moulinearn Crossing (down)	25·8
PITLOCHRY	28·5
Killiecrankie	32·2
BLAIR ATHOLL	35·3
Struan	39·8
Dalanraoch (down)	44·6
Dalnaspidal	51·0
Druimuachdar Summit (no box)	53·0
Dalwhinnie	58·6
Inchlea Crossing (up)	62·6
Etteridge Crossing (down)	65·9
Newtonmore	68·7
KINGUSSIE	71·6
Kincraig	77·4
Dalraddy Crossing (down)	79·6
AVIEMORE	83·3
Carr Bridge	90·0

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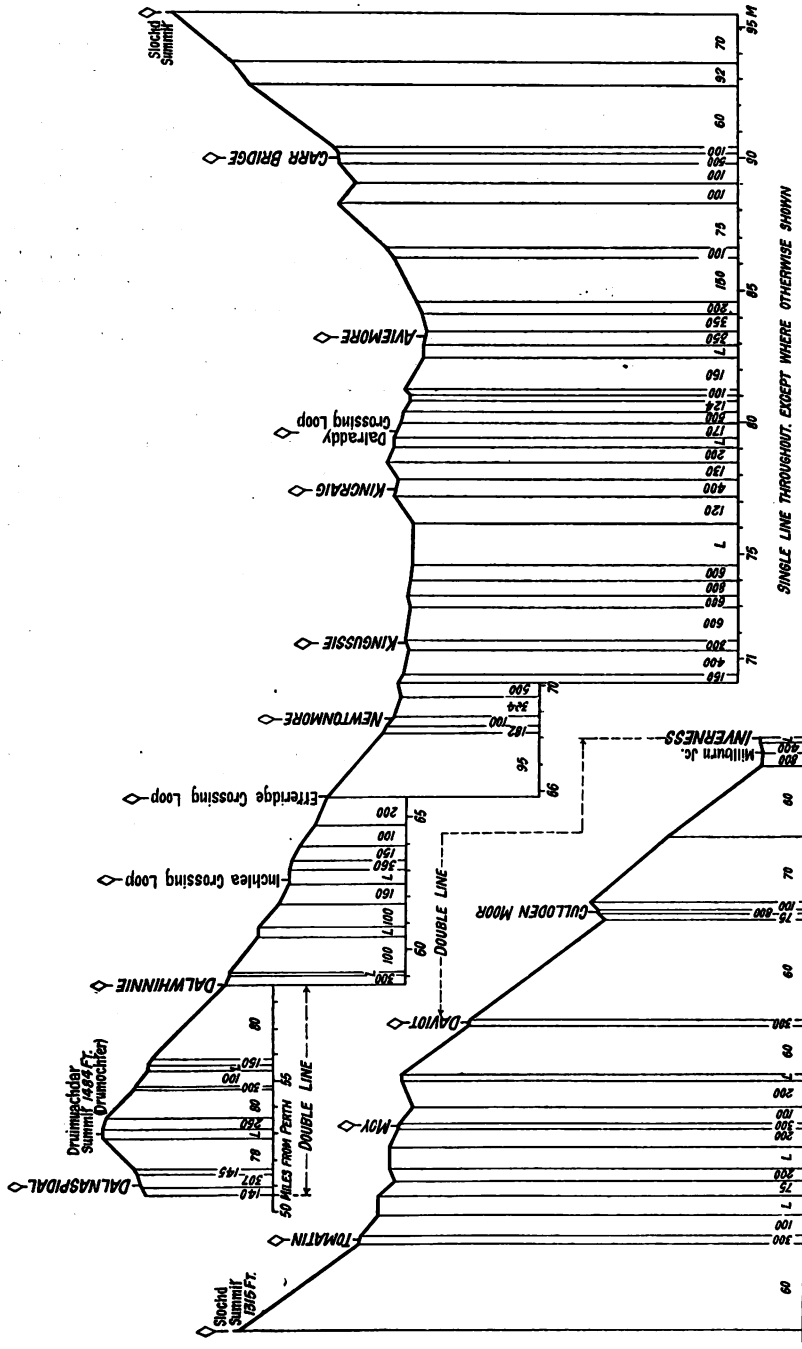

SHEET 29.—GRADIENT PROFILES, LONDON MIDLAND & SCOTTISH RAILWAY.

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	Miles.
Slochd Crossing South (down)	95·2
Slochd Crossing North (up)	95·6
Tomatin	99·0
Moy	103·1
Daviot	107·0
Culloden Moor	111·3
Millburn Junction (up)	117·4
INVERNESS	118·0

AVIEMORE TO INVERNESS, VIA *FORRES* (Sheet 30).

For 11½ miles down the Spey Valley from Aviemore this—the original main line—is fairly level, but the climb out of the valley from near Grantown-on-Spey to the 1,052-ft. summit at the 101 mile-post, in the direction of Nairn, is severe. It includes 5 miles at 1 in 80, or but slightly flatter. Then comes a descent of 18¾ miles to Forres, not greatly dissimilar from that of the "Direct" line into Inverness, save that the former is of flatter inclination. Its worst stretch—from near the 105½ to the 119 mile-post—includes 11½ miles at between 1 in 70 and 75, and is broken only by ⅜-mile up at 1 in 300 near Dunphail. From Forres through Nairn to Inverness, however, the going is easy, consisting of gentle undulations, nowhere steeper than 1 in 200, save in the first 4¼ miles.

DISTANCES.

Mile-posts, down side, Aviemore to Inverness (from zero at Perth).

	Miles.
AVIEMORE	0·0
Boat of Garten	5·2
Broomhill	9·4
GRANTOWN-ON-SPEY	12·6
Summit (no box)	18·3
Dava	21·1
Dunphail	27·4
FORRES	36·0
Brodie	39·4
Auldearn	43·1
NAIRN	45·5
Gollanfield Junction	51·0
Dalcross	53·8
Allanfearn	57·4
Milburn Junction (up)	60·0
INVERNESS	60·6

FORRES TO ELGIN AND KEITH (Sheet 30).

From Forres to Elgin this route is used by all the through daily services between Inverness and Aberdeen, but from Elgin to Keith by one eastbound service only, though this is, incidentally, by a margin of 23 minutes, the fastest service of the day. The gradients progressively steepen as Keith is approached, the worst of them being roughly 2 miles at 1 in 103 between Kinloss and Alves, then 3½ miles at 1 in 95-98 between Elgin and Orbliston Junction, and lastly 2½ miles at 1 in 60 from the fine bridge crossing the Findhorn near Orton up to Mulben ; all these face eastbound trains.

DISTANCES.

Mile-posts, up side, Forres (zero) to Keith.

	Miles.
FORRES	0·0
Kinloss	3·2
Alves	7·0
Mosstowie	9·0
ELGIN	12·2
Lhanbryde	15·6
Orbliston Junction	18·5
Orton	21·9
Mulben	25·3
Tauchers	26·4
KEITH	30·3

INVERNESS TO WICK (No profile).

The train service over this route is of so sparse a character, as well as so slow (the winter passenger trains calling at almost all stations throughout), that it was not deemed necessary to include a profile of the 161¼ miles of its length. In view of its importance as the main line stretching farthest north in the British Isles, however, the distances are given, and a brief note is now appended as to the gradients. As far as Invershin, 61 miles out of Inverness, there is little to remark. The ruling gradient is 1 in 100, but from 1 to 1¼ miles is the maximum length of any stretch at this figure. There are miniature "summits" at the 3½, 14¼, 21¾, 28¼, 36, 42, 49¼ and 51½ mile-posts, but save possibly for the 14¼ mile-post summit (with 1½ miles at 1 in 100 and 2 at 200 rising from the south, and 1¼ at 100-105 and ¾ at 180 from the north), the inclines up to each one are insignificant in character. Between Invershin and Rogart, however, a summit 488 feet above the sea, near the 69¼ mile-post, has to be surmounted. The rise to this includes nearly 3 miles at 1 in 72 from Invershin, and 2½ miles at 1 in 70 starting directly from Lairg Station. From the summit the drop is continuous for 7½ miles to Rogart Station, including ½-mile at 1 in 70, 4 miles at 80 and 2½

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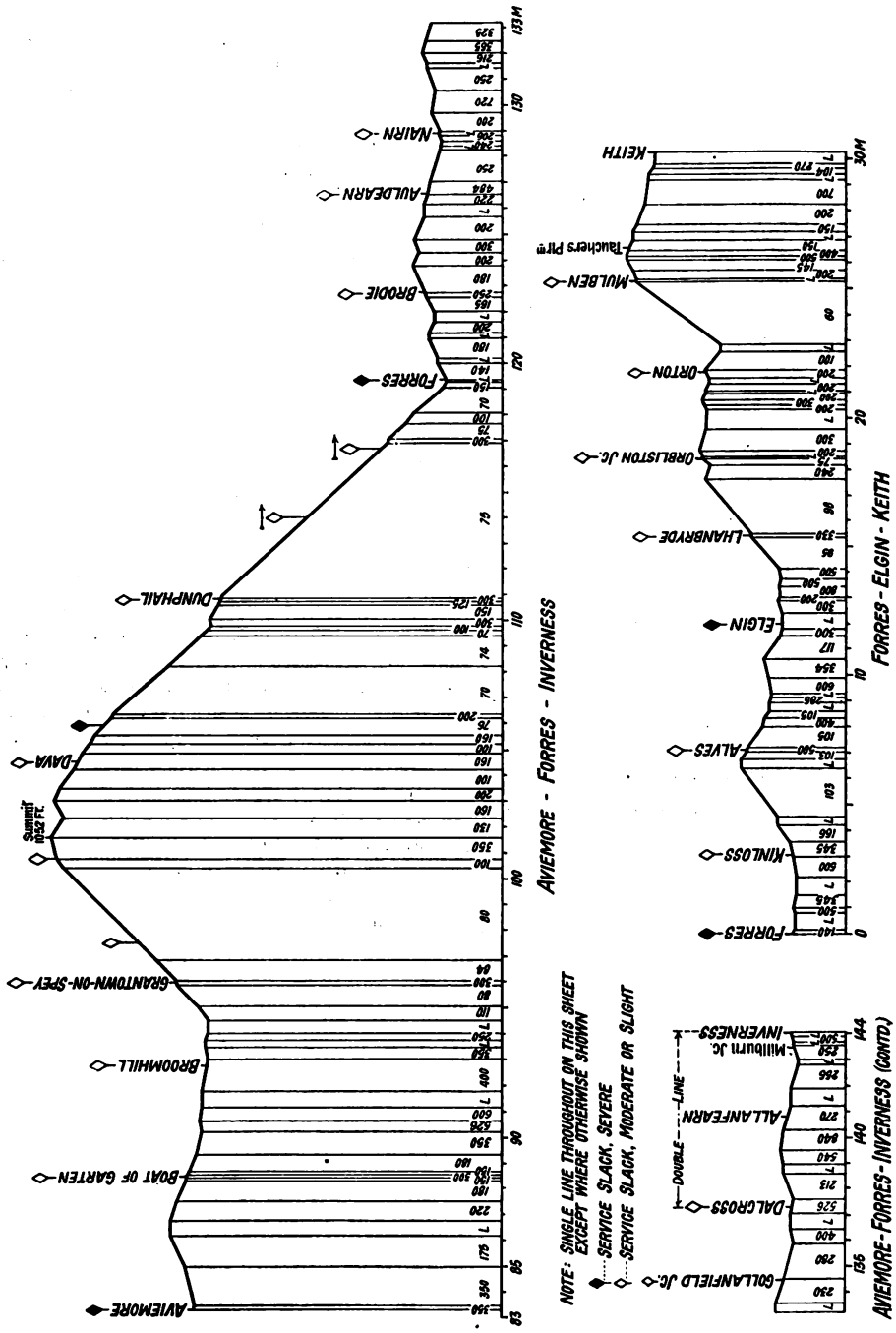

SHEET 30.—GRADIENT PROFILES, LONDON MIDLAND & SCOTTISH RAILWAY.

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at 1 in 95. Level conditions, with sharp undulations here and there, then resume to Helmsdale, save only for the 1½ miles at 1 in 60 rising from Golspie to Dunrobin and the corresponding drop of 1¼ miles at the same inclination beyond. At Helmsdale the line leaves the coast, and turns westwards and then northwards up Strath Ullie to Forsinard. Here it turns east again to rise to the summit, at 129½ miles, which marks the county boundary between Sutherland and Caithness, 708 feet above the sea. This ascent is, however, very broken in character, the worst pitches being 2¼ miles, mostly at 1 in 60-70, from Kildonan, and 3 miles at 1 in 60-140-80 from Forsinard to the summit. The descent of 17½ miles to Georgemas is steeper, being interrupted only by 1¾ miles, mainly rising at 1 in 70, past Altnabreac. To this point there are 4 miles down at 1 in 100-70 ; and short stretches at 1 in 60, 70, 80 and 100 are frequently met with in the unbroken fall from 135 miles to Georgemas Junction. After that the only grade worth mention is the bare mile at 1 in 60 from Bower, whence the line is practically level to Wick. Sharp curves are found near Clachnaharry, Conon, and the 54 mile-post ; there is also much bad reverse curvature between Invershin and Lairg, near Loth, and between Helmsdale and County March summit. There are some further very circuitous locations of the Highland main line north of Inverness. From Tain to Golspie is 13 miles in a direct line, and 40 miles by rail round Dornoch Firth. From Helmsdale to Wick is roughly 30 miles up the coast, but the railway travels 60 miles in covering the same distance. Still more astonishing, perhaps, is the fact that the 57 miles from Elgin across the wide sweep of the Moray Firth translates itself into no less than 204 miles by rail, and a journey whose duration is between 8 and 9 hours!

DISTANCES.

Mile-posts, down side, Inverness (zero) to Wick.

	Miles.
INVERNESS	0·0
Clachnaharry (down)	1·3
Bunchrew	3·5
Lentran	5·6
Clunes	7·4
BEAULY	9·9
Muir of Ord	12·8
Conon	16·0
DINGWALL	18·5
Foulis	22·7
Novar	24·8
Alness	28·4
INVERGORDON	31·2
Delny	34·7
Kildary	36·5
Nigg	39·0
Fearn	40·5
TAIN	44·0
Glenmorangie Siding	45·3
Edderton	49·4
BONAR BRIDGE	57·6
Culrain	60·7
Invershin	61·1
LAIRG	66·6
Summit (no box)	69·1
Acheilidh Crossing (down)	72·3
Rogart	76·6
THE MOUND	80·6
GOLSPIE	84·1
Dunrobin (Private)	85·9
Brora	90·2
Loth	95·5
HELMSDALE	101·1
Salzcraggie Platform	103·9
Kildonan	110·7
Borrobol Platform	114·6
Kinbrace	117·9
Forsinard	125·4
Summit (no box)	129·5
Altnabreac	133·7
Scotscalder	142·8
Halkirk	145·5

	Miles.	Miles.
GEORGEMAS JUNCTION	147·0	147·0
Hoy	147·9	—
THURSO	153·7	—
Bower		149·8
Watten		153·7
Bilbster		156·1
WICK		161·2

EDINBURGH (PRINCES ST.) AND LARBERT (Sheet 28).

This section was omitted from the Caledonian profiles, but, in view of its importance, a space has been found for the profile on Sheet 28. London Midland and Scottish express trains from Edinburgh to the North follow this route, joining the L.M.S. main line at Larbert Junction ; and either here, or at Stirling or at Perth, they are attached to the main trains from Glasgow. The Edinburgh link, as will be seen, makes use of London and North Eastern metals for almost the whole of its length. Apart from the sharp drop of a mile from Dalry Road to Haymarket West Junction, and the 3 miles from Polmont Junction to the Grahamston Station at Falkirk, the line is level throughout ;

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it forms part, in fact, of the level main line of the L.N.E.R. from Edinburgh to Glasgow.

DISTANCES.

Mile-posts, down side, Haymarket West Junction to Larbert Junction (from zero at Edinburgh, Waverley).

	Miles.
EDINBURGH (PRINCES ST.)	0·0
Dalry Road	0·7
Haymarket West Junction (down)	1·7
Saughton Junction (up)	2·9
Gogar	4·9
Ratho	7·6
Broxburn Junction (down)	10·2
Winchburgh	11·4
Winchburgh Junction (up)	12·0
Philpstoun	13·9
LINLITHGOW	17·0
Manuel	19·2
POLMONT	21·7
FALKIRK (GRAHAMSTON)	24·9
Swing Bridge Junction	25·7
Falkirk (Camelon)	26·1
Carmuirs East Junction	26·7
Larbert Junction (down)	27·1
LARBERT	27·8

In concluding this series of L.M.S. profiles, the writer desires to acknowledge his indebtedness to the General Superintendent of the London Midland and Scottish Railway for the loan of the official gradient profiles, on which the profiles reproduced have throughout been based. Before proceeding to the gradients of the Great Western Railway, we shall next month consider those of the important joint lines in which the L.M.S. Company is immediately interested, the next instalment giving the gradients of the Somerset and Dorset, Midland and Great Northern and L.M.S. and Great Western Joint Lines.

Through the vigilance of one or two correspondents, attention has been drawn to one or two further minor errors which have occurred in the London Midland and Scottish series of profiles and tables. In the first instalment dealing with the Midland Division (August last), p. 206, Westhouses and Blackwell Station, at 137.1 miles, was omitted from the profile. At 202.7 miles (p. 208) Calverley Station was shown in place of Apperley Bridge and Rawdon, which was omitted. Calverley should have been shown at 201.0 miles. On pp. 206 and 208 respectively, Ilkeston Junction and Hawes Junction were indicated on the profiles, by a draughtsman's error, as junctions only, and not as stations. In the instalment giving the profiles of the Caledonian Section (December), Dolphinton Junction was shown as 73.8 miles; it should be 73.5 miles from Carlisle. There is also an inaccuracy in the mile-post locations on the profile from Carstairs to Edinburgh (p. 474); Strawfrank Junction should have been shown at, roughly, 73¼ miles instead of 74 miles, and all the posts throughout to Edinburgh should be moved ¾-mile to the right. Grateful acknowledgment is due to the correspondents concerned for pointing out these errors.

MR. E. J. FASHAM'S PUZZLE QUERY.

THE train in question is the 8.45 p.m. from York to Newcastle, which includes 4 L.N.E.R. vehicles from King's Cross, 2 S.R. coaches from Bournemouth, 1 L.M.S. carriage from Bristol, and a G.W.R. brake van for through luggage and parcels traffic.

No reader has specified this example, but Mr. W. H. Shepherd suggests the 7.35 a.m. from Newcastle and 10 a.m. from Bradford joining at Sheffield and proceeding *via* Oxford to Bournemouth, thus including L.N.E.R. coaches from Newcastle, L.M.S. vehicles from Bradford, G.W.R. stock from Banbury, and S.R. carriages from Winchester.

Mr. P. J. R. Wright writes:—"Until last summer the through Bournemouth-Newcastle express could be regularly seen between Basingstoke and Banbury, consisting of G.W.R. locomotive; S.R. passenger vehicles; L.N.E.R. dining-car; and L.M.S.R. luggage or postal vans. Since the inauguration of the summer train service last July, the S.R. and L.N.E.R. have provided the entire rolling-stock (except the locomotive) on alternate days. This is the only train which to my knowledge has regularly conformed to Mr. Fasham's conditions in recent years."

Mr. C. M. Furst and other readers have mentioned instances of three of the railways being represented on one train.

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The New "Underground" Headquarters Building.

THIS building has been designed to centralise the administrative and general activities of the associated "Underground" companies and accommodate the staffs of the Underground Electric Railways Company of London Limited, Metropolitan District Railv Company, London Electric Railway Company, City & South London Railway Company, Central London Railway Company, London General Omnibus Co., Ltd., The Metropolitan Electric Tramways, Limited, The London United Tramways, Limited, and the South Metropolitan Electric Tramways & Lighting Co., Ltd. Styled "55 Broadway," it is already a notable landmark in the metropolis, and occupies a corner site between Broadway and Petty France, Westminster, and is over and adjoining the St. James's Park Station of the Metropolitan District Railway, part of the booking offices and approaches to which are included in the new structure.

Some idea of its general proportions may be gathered when it is stated that the building covers an area of 31,000 sq. ft. Upon a low base composed of two storeys and a basement, it is piled up to a height of 120 ft., in the form of a cross, with its arms stretching out to the corners—the arm towards Tothill Street being longer than the others. In the centre, at the crossing, a tower rises up to a total height of 185 ft. above pavement level. The cruciform section measures 236 ft. in the overall length, and 176 ft. across the transepts. Each of the four wings is 48 ft. in width. The west wing is 76 ft. in length, the east wing 100 ft., and the north and south wings 60 ft. in each case. The whole is surmounted by a 60-ft. flagstaff. To meet the requirements of the London Building Acts, neither the large area of the ninth floor nor the tower is used for office purposes.

The cruciform plan adopted for the building has ensured ample lighting of the apartments on three sides directly from the streets, a feature which would have been impracticable in a building of the conventional quadrilateral plan with a centre court or well. The windows throughout are fitted with Vita glass, and comprise an area of some 5,000 sq. ft. As far as possible each complete wing on each floor is set apart for a separate company or section, subdivided on each side of a central corridor as desired, on the basis of "units," each having two windows and independent control of heating. Internal divisions are made by Roneo metal partitions, with muranese glass, and fitted with doors as required. These partitions, which are, of course, fireproof, enable the size of an office to be adjusted at will, and as they extend from the floor to the ceiling, they afford all the advantages of brick walls with none of the disadvantages. The whole of the accommodation not being required by the Underground Railways, floors 4, 5, 6 and 8 have been made available for use as offices for various tenants.

The central situation of the portion below the tower enables the various service appurtenances to be established here with the maximum of efficiency. On the west are the passenger lifts ; on the east the service lift, the lavatories and the main staircase. Minor staircases are in the east and west wings. In the recesses of the external angles on the north-west and the south-west are emergency balconies, of convenient situation, and so contrived that they do not disfigure the exterior of the building. The tower contains the lift plant and water tanks.

Demolition of the old buildings occupying the site commenced in May, 1927. Owing to the presence of the railway, the task of preparing the foundations imposed difficulties, as it was only during short intervals overnight that work could be conducted on this part of the site. The nature of the ground—clay, with a thin layer of peat, surmounted by gravel and sand—rendered extensive piling necessary. In all, 700 reinforced-concrete piles were driven into the ground, to an average depth of 40 ft. below basement

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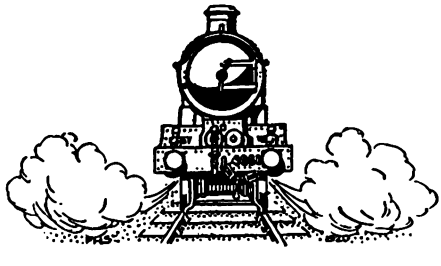
level. Nineteen steel girders, of an average length of 52 ft. and a total weight of 620 tons, span the railway, and afford some indication of the task that had to be accomplished here by the "Underground" engineers without disturbance to traffic. The total weight carried by the piling and the substructure is about 35,000 tons. To prevent the transmission of vibration set up by the trains, the railway has been insulated from the new building by means of felt packing. In one of the piles is a memento for posterity, in the form of a cylinder inscribed with notes on the building and the "Underground" and containing photographs of the site, an "Underground" car, and a "General" omnibus.

The steel skeleton of the building comprises 2,500 tons of stanchions and girders, rising to a height of 176 ft. in the tower. This is the tallest steel framework that has ever been erected for any building in London. Some of the stanchions in the tower, which are carried right up from the foundations, have a total length of 190 ft.

The Portland stone with which the building is faced came from the Whit bed of the Broadcroft quarries, and altogether 78,000 cub. ft. have been used.

The ground floor, apart from the section constituting the station booking hall, and space allocated for the use of lessee firms, accommodates the general mail room, the Registration office of the Department of the Secretary and Treasurer, General Inquiry (all services), Lost Property (railways), Private Hire (all services), Season Ticket (railways) and Poster Sales offices, together with the House Superintendent's office. The first floor is given over to the Traffic Auditor and the Accounts Officer, with their staffs, while on the second floor are the offices and staffs, in the respective wings, of the Operating Manager (Railways), Superintendent of the Line, Publicity Manager (including Press Bureau and Advertising), and Commercial Manager. On the third floor is a Central Typing Office, and sections devoted to the work of the Operating Manager and Chief Engineer (Omnibuses), Traffic Superintendent (Omnibuses), Legal and Parliamentary Officer, and the Estate Agent. The fourth and fifth floors have been taken over by the well-known Consulting Engineers, Rendel, Palmer & Tritton, whilst the sixth and eighth are similarly being occupied by Dorman, Long & Co., Ltd. The seventh floor is reserved for the directors and chief officers, with their staffs. Lord Ashfield has a series of rooms, including the directors' board room, whilst other suites are used by Sir Ernest Clark (Financial Director), Mr. Frank Pick (Managing Director), Mr. J. C. Mitchell (Secretary and Treasurer), and by the Receiving Cashier.

The lower floors are, of course, in direct communication with the older premises adjacent, and the corridors are thus continuous, so that the new and old offices are closely associated, some departments having, in fact, offices in both sections.



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THE RAILWAY PORTRAIT GALLERY.

MR. W. V. WOOD,

Appointed Vice-President, Finance and Service Departments, London Midland & Scottish Railway.

MR. W. V. WOOD, who has been appointed Vice-President for Finance and Services, as from January 1, entered the service of the Belfast & Northern Counties Railway Company in 1898, in the Accountant's Office. On the Government taking control of the Irish Railways in 1917, he was appointed Secretary, and later, a Member of the Railway Accountants Committee, set up by the Irish Railway Executive Committee. On the formation of the Ministry of Transport in 1919, Mr. Wood was transferred to London as Director of Transport (Accounting), and in 1921 was appointed Accountant to the Ministry. In 1924 he resumed railway service as Assistant to the Accountant-General of the London Midland & Scottish Railway Company, and in 1927 was appointed Controller of Costs and Statistics, which position he has just vacated to assume the responsibilities of Vice-President for Finance and Services.

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The Scottish Locomotives of the L.M.S.R.—(II.)

By "INDICATOR."

THE 15000's are all classed as passenger tank engines. The earlier ones are old engines of obsolete designs but still serve a useful purpose on suitable light duties.

There are two 0-4-2T engines only, Nos. 15000*-1 = Caledonian 1262-3.

4-4-0T engines are also very few and mostly old:—

15010-1*-2-3-4-5*-6*-7* = Highland 59B, 58B, 50B, 101, 102, 51B, 52B and 54B, with
15020-1-2-3-4-5-6-7-8-9, 15030*-1* = Caledonian 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12.

The 0-4-4T's are, of course, the most numerous, as it was the favourite Caledonian tank engine type, while the G. & S.W. had a number. The only Highland 0-4-4T's are those which come first, all old:—

15050-1-2-3-4 = 53A, 25, 40, 45-6.

Then come the Caledonian 0-4-4's:—

15100*-1*-2*-3-4-5*-6*-7*-8*-9* = 1172-4-5-7-8, 1229-2-3-4-7.
15110*-1*-2*-3*-4 = 190, 1191-2-3-4
15115-6-7-8-9 = 19, 20-1-2-3
15120-1-2-3-4-5-6-7-8-9 = 24-5-6-7-8, 13-4-5-6-7
15130-1-2-3-4-5-6-7-8-9 = 18, 98-9, 100-1-2-3, 879, 880-1
15140-1-2-3-4-5-6-7*-8-9 = 882-3-4-5-6, 437-8, 104-5-6
15150-1-2-3-4-5-6-7-8-9 = 107-8-9, 110-1, 67-8-9, 170, 439
15160-1-2-3-4-5-6-7-8-9 = 440-1-2-3-4-5-6-7-8-9
15170-1-2-3-4-5-6-7-8-9 = 450-1-2-3-4-5 151, 423, 473, 112
15180-1-2-3-4-5-6-7-8-9 = 125 424, 463-4-5-6, 660, 666, 158, 419
15190-1-2-3-4-5-6-7-8-9 = 422, 429, 470, 126-7, 420-1, 427-8 456
15200-1-2-3-4-5-6-7-8-9 = 467-8-9, 155, 160, 459, 461, 152-3-4
15210-1-2-3-4-5-6-7-8-9 = 156, 460, 462, 157, 164, 457-8, 228-9, 230
15220-1-2-3-4-5-6-7-8-9 = 231, 222-3-4-5-6-7—159, 161-2
15230-1-2-3-4-5-6-7-8-9 = 163, 418, 425-6, 430, 435-6, 431-2-3
15240 = 434

There are only 14 G.S.W. 0-4-4T's for passenger service, these being:—

15241*-2*-3*-4*-5-6-7-8-9 = 728-9, 730-1, 520-1-2-3-4
15250-1-2-3-4 = 525-6-7-8-9

The remaining passenger tank engines are of more advanced types which may be set out thus:—

0-6-4T (Highland).
15300-1-2-3-4-5-6-7 = 39, 66, 68-9, 43, 31, 42-4

4-6-2T (Caledonian).
15350-1-2-3-4-5-6-7-8-9 = 944-5-6-7-8-9, 950-1-2-3
15360-1 = 954-5

4-6-4T (G.S.W).
15400-1-2-3-4-5 = 540-1-2-3-4-5.

No. 16000 commences the goods tank engines, and, as in the case of the 15000's, the series begins with various more or less obsolete and usually small classes. First come the 0-4-0T's, a rather numerous class, as both the Caledonian and the Glasgow and South Western had a number of these engines specially for use in works and other yards, about the workshops and on other duties which called for a small short-wheelbase engine. The Caledonian engines are:—

16000*-1-2*-3-4-5-6*-7-8*-9, 16010 = 1781, 1162-3, 1503, 1505, 1529, 1532, 1534, 266-7-8
16011-2*-3-4*-5-6-7*-8*-9 = 270, 1264-5, 1271, 615-6-7-8, 620
16020-1*-2-3*-4*-5-6-7-8-9 = 1510-1-2-3-4-5, 611-2-3-4
16030-1-2-3-4-5-6*-7-8-9 = 621-2-3-4-5-6-7-8, 265, 269;

Glasgow and South Western engines are:—

16040-1*-2*-3-4-5-6-7-8-9 = 659, 658, 734-5, 316-7-8-9, 320-1.

Finally, there were Nos. 16050-1, Glasgow and Paisley Joint 0-4-0T's Nos. 1 and 2, but both are now scrapped.

Besides the passenger 0-4-4T's the G.S.W. had a few 0-4-4T's for working in covered yards and classed for goods traffic. These are:—

16080*-1-2-3-4-5 = 305-6-7-8-9, 310.

As on every big railway, the 0-6-0T's

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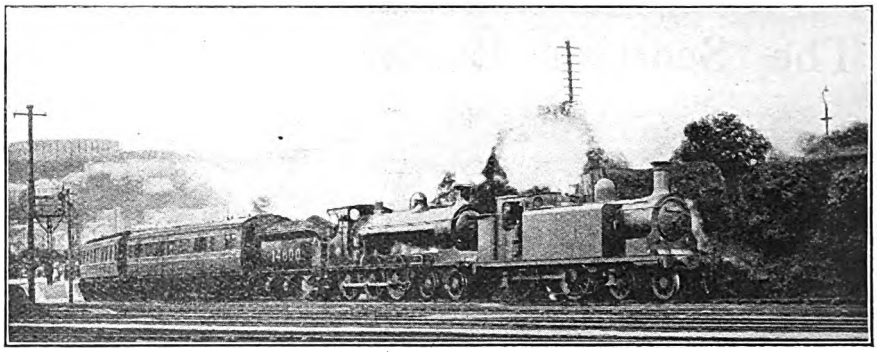
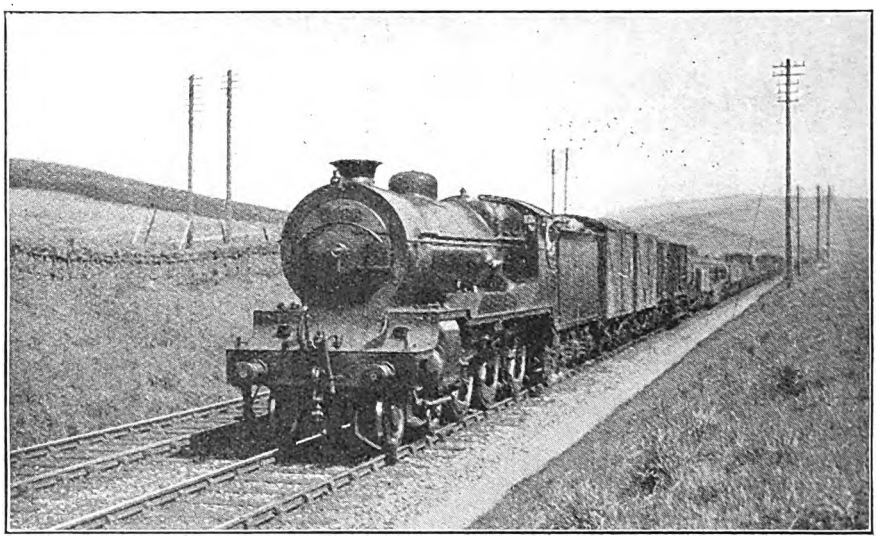
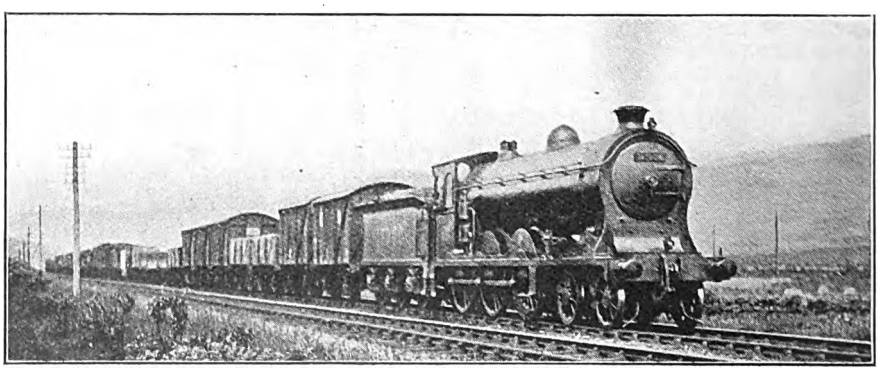


C.R. 4-4-0T No. 15028 AND 4-6-0 No. 14600 AT OBAN.



4-6-0 No. 14756 ON GOODS TRAIN.



C.R. 4-6-0 No. 17906 ON GOODS TRAIN.

(*Photos by C. J. L. Romanes.*)

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are necessarily numerous. First come small ones, those of Caledonian origin being:—

16100*-1*-2* = 1273-4, 1509.

Then come the G.S.W. engines:—

16103*-4-5-6-7-8-9 = 277-8, 280, 282, 284-5-6
16110-1-2-3-4-5-6-7 = 287-8-9, 275-6, 279, 281, 283.

There are also two small Highland engines:—

16118*-9 = 56B and 57B.

The next series is all Caledonian:—

16150*-1-2-3-4-5-6-7-8-9 = 1489, 498-9, 527-8-9, 530-1-2-3
16160-1-2-3-4-5-6-7-8-9 = 534-5-6-7-8, 502-3-4, 510-1
16170-1-2-3 = 512-3-4-5.

Then comes a long series, all except a few at the end being Caledonian:—

16200*-1*-2-3*-4-5*-6*-7*-8*-9* = 216-7, 383-4-5, 505-6-7, 218-9
16210-1-2*-3*-4-5*-6*-7*-8*-9* = 220-1, 1232-3, 1235, 388-9, 391-2, 398
16220*-1*-2*-3*-4*-5*-6*-7*-8*-9* = 399, 400-1-2, 1395, 211-2-3- 4-5
16230-1-2-3-4-5-6-7-8-9 = 650, 29, 203-4-5-6-7-8-9, 210
16240-1-2-3-4-5-6-7-8-9 = 236-7-8-9, 240-1-2-3-4-5
16250-1-2-3-4-5-6-7-8-9 = 246-7, 485, 516, 782-3-4-5-6-7
16260-1-2-3-4-5-6-7-8-9 = 788-9, 790-1-2-3-4-5-6-7
16270-1-2-3-4-5-6-7-8-9 = 798-9, 800-1-2-3-4-5-6-7
16280-1-2-3-4-5-6-7-8-9 = 808-9, 810-1, 488, 631-2-3-4-5
16290-1-2-3-4-5-6-7-8-9 = 636-7-8-9, 640-1-2-3-4-5
16300-1-2-3-4-5-6-7-8-9 = 646-7-8-9, 128-9, 166, 271, 275-6
16310-1-2-3-4-5-6-7-8-9 = 417, 472, 489, 501, 629, 630, 667-8-9, 475
16320-1-2-3-4-5-6-7-8-9 = 476-7-8-9, 480, 487, 490-1, 416, 474
16330-1-2-3-4-5-6-7-8-9 = 481-2-3-4, 500, 608-9, 610, 277, 393
16340-1-2-3-4-5-6-7-8-9 = 397, 405, 471, 486, 390, 130-1, 171-2-3
16350-1-2-3-4-5-6-7-8-9 = 174, 651, 781, 175-6-7-8, 508-9, 232.
16360-1-2-3-4-5-6-7-8-9 = 233-4-5, 272-3-4, 248-9, 250-1
16370-1-2-3-4-5-6 = 252-3-4-5, 394-5-6.

This series is completed by 3 G.S.W. and 4 H.R. engines:—

16377-8-9 = G.S.W. 322-3-4
16380-1-2-3* = Highland 22-3-4 and 49A.

The Glasgow and South Western was the only Scottish section with any 0-6-2T's, and these were originally numbered 16400-16427. More recently they have been renumbered, to allow of a consecutive series of numbers being given to the new L.M.S. 0-6-0T's, so that they are now:—

16900-1-2-3-4-5-6-7-8-9 = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

TANK ENGINES.

Class.	Cylinders, Inside.	Coupled Wheels.	Steam Pressure.	Heating Surface.	Grate Area.	Weight (Engine.)
	Inches.	Ft. In.	Lb. per Sq. In.	Sq. Ft.	Sq. Ft.	Tons.
Caledonian :—						
McIntosh 19 (0-4-4)	18 × 26	5 9	150	1095·76	17	53¾
,, 13 (0-4-4)	18 × 26	5 9	150	1095·76	17	55¾
,, 104 (0-4-4)	17 × 24	4 6	150	1086	17	51¼
,, 782 (0-6-0)	18 × 26	4 6	150	1086	17	47¾
,, 492 (0-8-0)	19 × 26	4 6	175	1189	19·5	62¾
,, 498 (0-6-0)	17 × 22	4 0	160	860	14·25	47¾
Pickersgill 955 (4-6-2)	19½ × 26	5 9	170	1716	21·5	91¾
G.S.W. :—						
J. Manson 305 (0-4-4)	16 × 22	4 7½	140	890	12	42½
,, 520 (0-4-4)	17¼ × 24	5 2	150	1169	16·5	54¼
,, 323 (0-6-0)	17 × 22	4 2	160	838	17·15	40
P. Drummond 1 (0-6-2)	18¼ × 26	5 0	180	1254	22·5	66¼
R. H. Whitelegg 540 (4-6-4) ..	22 × 26	6 0	180	1985	30	99
Highland :—						
P. Drummond (0-6-4)	18¼ × 26	5 0	175	1268	22·4	69½

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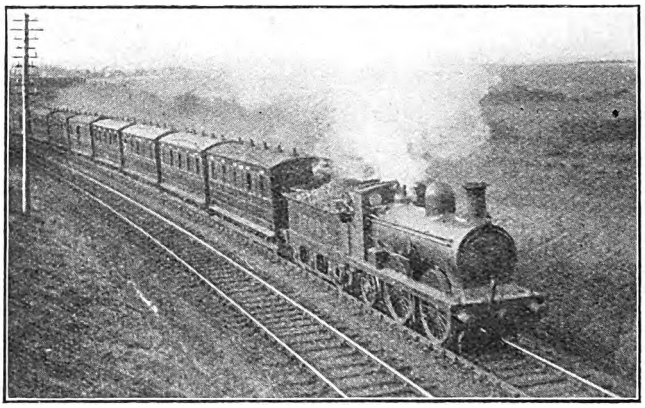

Photo.] **G.S.W. 0-4-2 No. 17065.** [*C. J. L. Romanes.*

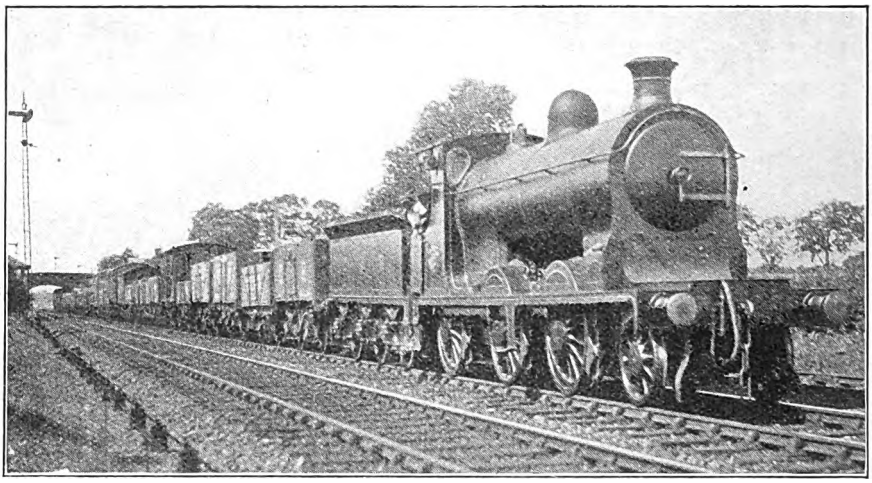

Photo.] **C.R. 2-6-0 No. 17804 (38).** [*H. Gordon Tidey.*

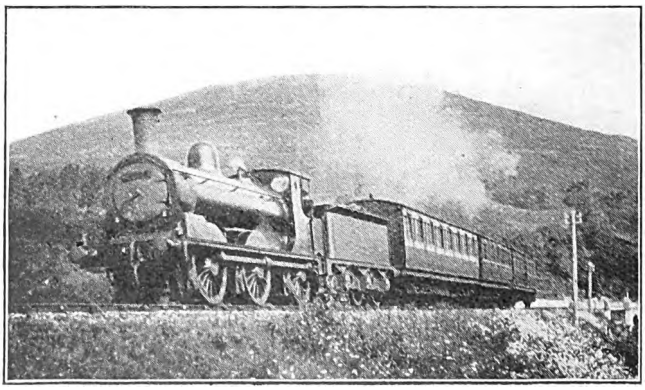

Photo. [*C. J. L. Romanes.*

C.R. 0-6-0 No. 17457 NEAR LOCHEARNHEAD.

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16910-1-2-3-4-5-6-7-8-9 = 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

16920-1-2-3-4-5-6-7 = 21, 22, 23, 24, 25, 26, 27, 28.

Similarly the Caledonian 0-8-0T's, at first 16500-16505, are now:—

16950-1-2-3-4-5 = 492-3-4-5-6-7.

The 17000's are all goods tender engines of various classes, and here we have a power classification again, with a fair number of the old engines now scrapped. First come a few 0-4-2's, though this is, of course, a long since obsolete type for new construction. The following are the Caledonian engines (power class 1) of this type:—

17000*-1*-2-3-4*-5*-6*-7-8*-9* = 1672-3. 1676, 1253, 1255, 1718, 1716, 1674-5, 1677

17010*-1-2*-3-4*-5*-6*-7*-8-9* = 1679, 165, 278-9, 1164, 1248, 1250-1, 1275, 1280

17020 = 1717.

The remainder are G. & S. W., mostly the once numerous Stirling 0-4-2's:—

17021*-2*-3*-4*-5*-6*-7*-8*-9 = 656-7, 651-2-3-4-5, 268-9

17030*-1-2-3*-4*-5*-6*-7*-8*-9* = 270-1-2-3-4, 635-6-7, 639, 641

17040*-1*-2*-3*-4*-5*-6*-7*-8-9* = 644-5-6-7-8-9, 241, 243-4, 249

17050*-1*-2*-3-4-5-6-7-8* = 251, 255, 257, 262, 266-7, 238-9, 245

17059*, 17060*-1*-2*-3*-4*-5*-6-7-8*-9* = 25-3-4, 256, 258-9, 260-1, 263, 265, 242, 246

17070*-1*-2*-3*-4*-5* = 248, 250, 264, 240, 247, 252.

This brings us to the 0-6-0's of power class 1. First there is a single G. & S.W. 0-6-0, No. 17100*=619, followed by two Caledonian 0-6-0's, 17101*-2* = 381-2. Then come a series of G. & S.W. 0-6-0's, now power class 2, as follow:—

17103*-4*-5*-6*-7*-8*-9* = 563, 573, 565, 572, 575-6-7

17110*-1*-2*-3*-4*-5*-6*-7-8-9* = 578, 584, 566-7, 570-1, 592, 139, 605-6

17120*-1*-2-3*-4*-5*-6*-7*-8*-9 = 564, 579, 590-1, 593-4, 574, 580, 135, 560

17130*-1-2*-3-4*-5*-6-7*-8-9* = 561-2, 568-9, 138, 581-2, 607-8-9

17140*-1-2-3*-4-5*-6-7-8*-9* = 610-1-2-3-4-5-6, 136, 583, 585

17150*-1*-2*-3-4-5-6-7*-8-9* = 586, 597, 599, 601-2, 137,587, 595-6, 598

17160*-1*-2*-3-4*-5*-6-7-8*-9 = 600, 603-4, 588-9, 178-9, 180-1-2

17170-1*-2*-3-4-5*-6-7-8*-9* = 183-4-5-6-7-8-9. 190-1-2

0-6-0 Goods Engines.

Class.	Cylinders, Inside.	Coupled Wheels.	Steam Pressure.	Heating Surface.	Grate Area.	Weight (Engine).	Weight E. & T.
	Inches.	Ft. In.	Lb. per	Sq. Ft.	Sq. Ft.	Tons.	Tons.
Caledonian :—							
McIntosh 736	18 × 26	5 0	150	1169·2	19·5	42¼	77¼
,, 282	18½ × 26	5 0	160	1403·2	20·6	45¾	83½
,, 30	19½ × 26	5 0	160	1457	20·6	51¼	89
Pickersgill 300	18½ × 26	5 0	170	1452	20	49¼	86½
G.S.W. :—							
J. Manson 115	18 × 26	5 1½	165	1208	18	44	75½
Highland :—							
P. Drummond	18¼ × 26	5 0	175	1175	20·3	43	83
		2-6-0					
G.S.W. :—							
P. Drummond 51	19½ × 26	5 0	180	1702	26·25	62	109¼
		0-8-0					
Caledonian :—							
McIntosh 600	21 × 26	4 6	175	2108	23	60¾	101¾

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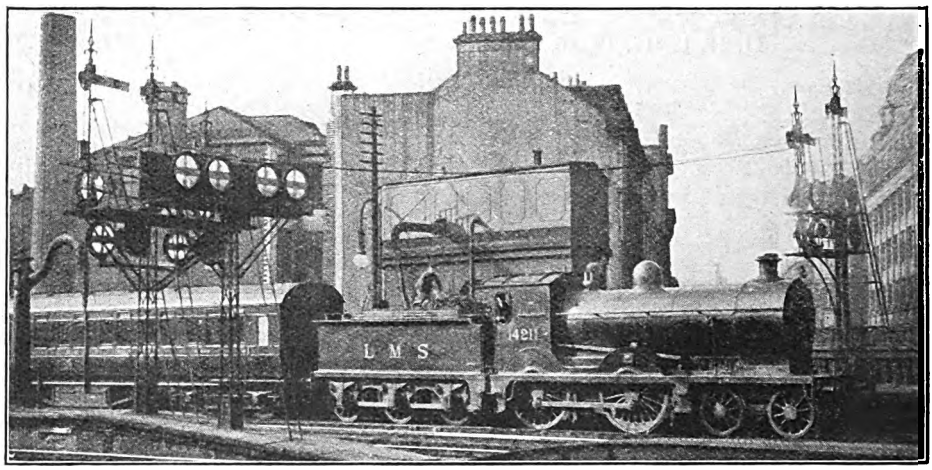

Photo.] G.S.W. 4-4-0 No. 14211 AT ST. ENOCH, GLASGOW. [*J. J. Cunningham.*

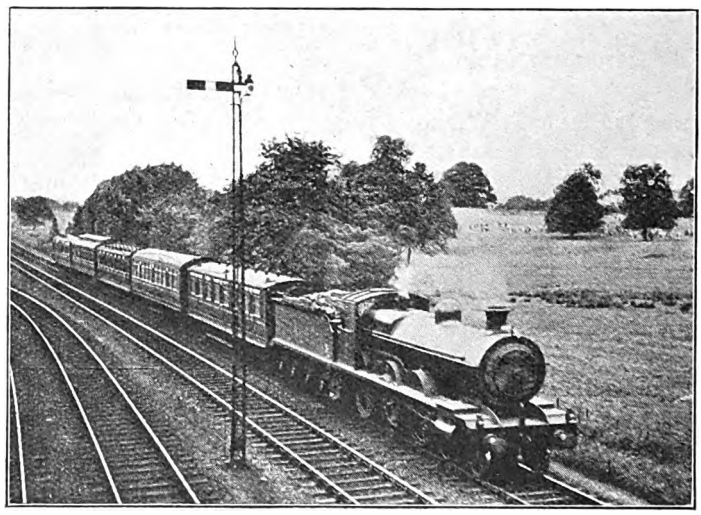

Photo. [*C. J. L. Romanes.*

CARLISLE TRAIN AT DUMFRIES, 4-6-0 No. 14660.

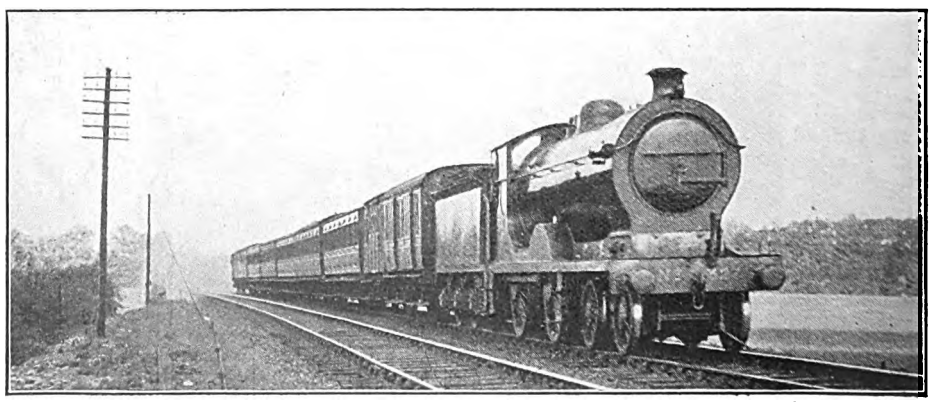

Photo.] TRAIN APPROACHING CARLISLE, 4-4-0 No. 14518 (327). [*H. Gordon Tidey.*

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17180*-1*-2*-3-4*-5-6*-7-8-9 = 193-4-5-6-7, 160-1-2-3-4
17190-1*-2-3-4*-5-6*-7-8*-9 = 165-6-7-8-9, 170-1-2-3-4
17200*-1-2*-3-4*-5-6-7-8-9 = 175-6-7, 140-1, 143-4, 142, 145-6
17210-1*-2* = 147-8-9.

Caledonian 0-6-0's in power class 2 series are:—

17230-1-2-3-4-5-6-7-8-9 = 259, 260-2-3-4, 335, 337, 349, 350-1
17240-1-2-3-4-5-6-7-8-9 = 352, 365, 367, 374, 403, 517, 539, 548 549 1294
17250-1-2-3-4-5-6-7-8-9 = 353-4, 518-9, 520-1-2-3-4-5
17260-1-2-3-4-5-6-7-8-9 = 526, 681, 683-4-5-6-7-8-9, 1517
17270-1-2-3-4-5-6-7-8-9 = 1680, 1682, 361-2-3-4, 690, 35-6-75
17280-1-2-3-4-5-6-7-8-9 = 358-9, 360, 553, 558 680, 682, 703, 705, 707
17290-1-2-3-4-5-6-7-8-9 = 1310, 1315, 1318-19, 1365, 340-1-2-3-4
17300-1-2-3-4-5-6-7-8-9 = 345-6-7-8, 366, 368-9, 370-1, 380
17310-1-2-3-4-5-6-7-8-9 = 708, 1323, 1367, 1403, 404, 406-7-8-9, 410
17320-1-2-3-4-5-6-7-8-9 = 411-2-3-4-5, 372-3, 375-6-7
17330-1-2-3-4-5-6-7-8-9 = 378-9, 540-1-2-3-4-5-6-7
17340-1-2-3-4-5-6-7-8-9 = 551-2, 691-2-3-4-5-6, 1374, 1548
17350-1-2-3-4-5-6-7-8-9 = 1549, 1553, 1558, 1704, 1706-7-8, 550, 554-5
17360-1-2-3--45-6-7-8-9 = 556-7, 559, 560-1-2-3, 697-8-9
17370-1-2-3-4-5-6-7-8-9 = 700-1-2, 199, 200-1-2, 256-7-8
17380-1-2-3-4-5-6-7-8-9 = 261, 334, 336, 338-9. 704,706
17390-1-2-3-45/-7-8-9 = 1260, 1335, 1337, 711-2-3-4-5-6, 709, 710, 1259
17400-1-2-3-4-5-6-7-8-9 = 718-9, 720, 736-7-8-9, 740-1-2
17410-1-2-3-4-5-6-7-8-9 = 743-4-5-6-7-8-9, 750-1-2
17420-1-2-3-4-5-6-7-8-9 = 753-4-5-6-7-8-9, 760, 329, 330
17430-1-2-3-4-5-6-7-8-9 = 331-2-3, 564-5-6-7-8-9, 570
17440-1-2-3-4-5-6-7-8-9 = 571-2-3-4-5-6-7-8-9, 580
17450-1-2-3-4-5-6-7-8-9 = 581-2, 588-9, 590-1-2-3-4-5
17460-1-2-3-4-5-6-7-8-9 = 596-7-8-9, 761-2-3-4-5.583
17470-1-2-3 = 584-5-6-7

Remaining engines with power classification 2 are all G.S.W.:—

17474-5-6-7*-8-9 = 115, 117-8-9, 121, 124
17480-1*-2-3-4-5-6-7-8-9 = 126-7, 129, 131, 133-4, 122, 125, 130, 116
17490-1-2-3-4*-5-6-7-8-9 = 120, 123, 128, 132, 105, 110, 112, 103-4, 106
17500-1-2-3-4-5-6-7 = 107-8-9, 111, 113-4, 101-2

The following G. & S.W. engines are in in power class 3:—

17508-9, 17510-1-2-3-4-5-6-7-8-9 = 86-7-8-9, 90-1-2-3-4-5-6-7
17520-1-2-3-4 = 98-9, 100, 150-1

This brings us to a long series of Caledonian 0-6-0's of power class 3:—

17550-1-2-3-4-5-6-7-8-9= 812-3-4-5-6-7-8-9, 820-1
17560-1-2-3-4-5-6-7-8-9 = 822-3-4-5-6-7-8-9, 830-1
17570-1-2-3-4-5-6-7-8-9 = 832-3-4-5-6-7-8-9, 840-1
17580-1-2-3-4-5-6-7-8-9 = 842-3-4-5-6-7-8-9, 850-1
17590-1-2-3-4-5-6-7-8-9 = 852-3-4-5-6-7-8-9, 860-1
17600-1-2-3-4-5-6-7-8-9 = 862-3-4-5-6-7-8-9, 870-1
17610-1-2-3-4-5-6-7-8-9 = 872-3-4-5-6-7-8-9, 282-3-4
17620-1-2-3-4-5-6-7-8-9 = 285-6-7-8-9, 290-1-2-3, 652
17630-1-2-3-4-5-6-7-8-9 = 653-4-5-6-7-8-9, 662- 3-4
17640-1-2-3-4-5-6-7-8-9 = 665, 325-6-7-8, 661, 30-1-2-3
17650-1-2-3-4-5-6-7-8-9 = 294-5-6-7-8-9, 300-1 2-3
17660-1-2-3-4-5-6-7-8-9 = 304-5-6-7-8-9,310-1-2-3
17670-1-2-3-4-5-6-7-8-9 = 314-5-6-7-8-9, 320-1-2-3
17680-1-2-3-4-5-6-7-8-9 = 324, 280-1, 670-1-2-3-4-5-6
17690-1-2 = 677-8-9.

The only other power-class 3 0-6-0's are those of the Highland section, as follow:—

17693-4-5-6-7-8-9 = 134-5-6-7-8-9, 18
17700-1-2-3-4 = 19, 20-1, 36-7

Power class 4 is entirely provided from G. & S.W. stock:—

17750-1-2-3-4-5-6-7-8-9 = 71-2-3-4-5-6-7-8-9, 80
17760-1-2-3-4 = 81-2-3-4-5

There are two series of 2-6-0 engines, and, rather curiously, there is a substantial gap between them. The Caledonian engines are power class 3:—

17800-1-2-3-4 = 34-5-6-7-8,

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while the G.S.W. engines are power class 4:—

17820-1-2-3-4-5-6-7-8-9, 17830 = 51-2-3-4-5-6-7-8-9, 60-1.

Then come the 4-6-0 goods tender engines, beginning with the 918 Caledonian series (power class 3):—

17900-1-2-3*-4-5-6-7-8-9 = 918-9, 920-1-2, 179, 180-1-2-3
17910-1-2-3-4-5 = 184-5-6-7-8-9.

These are followed by the Highland 4-6-0 goods, the original Jones engines, and actually the first 4-6-0's to be introduced in the British Isles. These are (power class 4):—

17916-7-8-9 = 103-4-5-6
17920-1-2*-3-4-5-6-7-8-9, 17930 = 107-8-9, 110-1-2-3-4-5-6-7

The remaining 4-6-0 goods engines, Mr. Cumming's Highland class, are power class 4. These are:—

17950-1-2-3-4-5-6-7 = 75-6-7-8-9, 80-1-2.

This leaves only the Caledonian 0-8-0 engines to be accounted for in power class 6:—

17990*-1*-2*-3*-4*-5*-6*-7* = 600-1-2-3-4-5-6-7

MIDLAND AND GREAT NORTHERN JOINT RAILWAY LOCOMOTIVES.

(*Compiled by Mr. J. F. W. Boughton. See also "Pertinent Paragraphs."*)

Nos.	Type.	Class.	Maker.	Built.	Rebuilt.	Notes.
1-7	4-4-0	1	Sharp, Stewart & Co. ..	1894	—	"B"
9	4-4-2T	1	M. & G.N. Railway	1910	—	"A Tank"
9A	4-4-0T	1	Hudswell, Clarke & Co. ..	1879	—	—
11-14	4-4-0	1	Sharp, Stewart & Co. ..	1894	—	"B"
15	0-6-0T	1	M. & G.N. Railway	1901	—	—
16	0-6-0T	1	,, ,, ...	1905	—	—
16A	0-6-0ST	1	Fox, Walker & Co.	1877	—	—
17-18	4-4-0	1	Sharp, Stewart & Co. ..	1894	—	"B"
20	4-4-2T	1	M. & G.N. Railway	1909	—	"A Tank"
20A	4-4-0T	1	Hudswell, Clarke & Co. ..	1881	—	—
21-35	4-4-0	1	Beyer, Peacock & Co. ..	1881-8	—	"A"
36-39	4-4-0	1 (39/2)	Sharp, Stewart & Co. ..	1894	—	"B" (39 "C")
41	4-4-2T	1	M. & G.N. Railway	1904	—	"A Tank"
42-50	4-4-0	1(*a*)	Sharp, Stewart & Co. ..	1894	—	"B"(*a*)
51-57	4-4-0	2	,, ,, ...	1896	—	"C"
58-65	0-6-0	2 (62/3)	Neilson & Co...	1896	—	—
66-73	0-6-0	2(*b*)	Kitson & Co.	1899	—	—
74-80	4-4-0	1	Beyer, Peacock & Co. ..	1899	—	"B"
81-92	0-6-0	2	Dubs & Co.	1901	—	(*c*)
93	0-6-0T	1	Sharp Stewart & Co. ..	1874	1898	(*d*)
94	0-6-0T	1	,, ,, ..	1874	1904	(*d*)
95	0-6-0T	1	,, ,, ..	1874	1899	(*d*)
96	0-6-0T	1	,, ,, ..	1874	1899	(*d*)
97	0-6-0T	1	,, ,, ..	1874	1902	(*d*)
98	0-6-0T	1	,, ,, ..	1874	1897	(*d*)
99	0-6-0T	1	M. & G.N. Railway	1902	—	—

(*a*) Numbers 45 and 46 are Class 2 "C."
(*b*) Numbers 68, 69 and 71 are Class 3.
(*c*) These engines were built for the Great Northern Railway to the designs of Mr. H. A. Ivatt, but were subsequently handed over to the Joint Line (G.N., Class E6).
(*d*) These engines were originally built for the Cornwall Minerals Railway, but the traffic of that line not coming up to estimation, they were returned to the makers and were bought up by the Eastern & Midlands Railway in 1881. They bore C.M. Rly. numbors 11-18 They ran for some time on the Eastern and Midlands Railway with tenders, owing to the limited capacity of the water-tanks.

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New Connections at Lewisham, Southern Railway.

By V. W. ORFORD.

FOR many years past, and especially since the electrification of the suburban lines of the Southern Railway, the congestion of the late South Eastern Railway's route out of London has been an ever-increasing problem. One cause has been the working of the through goods traffic from the L.M.S. and L.N.E. systems, *via* Blackfriars, to the exchange sidings at Hither Green. In addition to the Southern Railway's own goods trains, about 40 of these through trains have been worked daily, and it will readily be realized that this necessarily slow-moving traffic has been a prime factor in the congestion.

By means of the new connections recently completed at Lewisham, it is now possible to divert this traffic on to a less congested route. Moreover, it is anticipated that, instead of the 40 through trains daily, as many as 80 will be dealt with in the future, and in addition a number from the G.W. and L.M.S. Railways which now travel by way of Stewart's Lane and Redhill.

The trains from the L.M.S. and L.N.E. lines, *via* the Metropolitan Railway and Blackfriars, instead of turning off by the Blackfriars loop, now continue along the former L.C. & D. line through Loughborough Junction and Nunhead, whence, proceeding by the long-derelict Greenwich Park branch, they join, by means of the new loops, the S.E. main and local lines in the vicinity of Lewisham.

The new works, sanctioned towards the end of 1927 at a cost of about £270,000 (including installation of colour-light signalling), involved heavy constructional labour, but were carried out with very little interruption of the ordinary services. To facilitate the work, on certain Sundays a portion of Lewisham station was closed, necessitating the working of the Mid-Kent trains *via* Park's Bridge Junction, and the only serious delay to business traffic was when the main line was once blocked for a few hours by a crane breakdown.

Owing to the restricted space available at the point where the Greenwich Park branch crosses the main line, it was found impracticable to form a direct connection between the two levels, and it was necessary to construct two separate loops. The first of these leaves the path of the Greenwich Park line at the eastern end of the disused Lewisham Road station, and curves sharply to the right. (The portion of the old line east of this point is now completely severed, and powers are being sought by the Southern Railway for its abandonment—it has not been used since the war.) The main line is crossed at an extremely acute angle by a large overbridge 240 feet in length. This bridge is the most notable feature of the scheme, and its massive appearance can be judged by the accompanying photograph. Immediately adjoining is a bridge over Thurston Road, by the side of, but at a considerably higher level than, that carrying the Mid-Kent line. From here to Lewisham station (hitherto known as Lewisham Junction) the new line runs parallel with the Mid-Kent at a falling gradient of 1 in 65, until a junction with the latter and the North-Kent is made just west of the station. This section is partly on a viaduct of reinforced concrete and brick, and partly on embankment. Structural alterations had to be made to the Mid-Kent platforms at Lewisham.

The other, and shorter, loop leaves the Mid-Kent line on the down side some 450 yards beyond Lewisham station, and, crossing the Ravensbourne by a new steel-and-concrete bridge, rises at a gradient of 1 in 70 to join the main line a short distance south of Park's Bridge Junction. To accommodate the new junction, the bridge carrying the main line over the Ravensbourne has been widened. The lengths of the new loops are respectively 528 yards and 470 yards.

A further feature of interest is the installation of four-aspect colour-light signals from New Cross and Nunhead to

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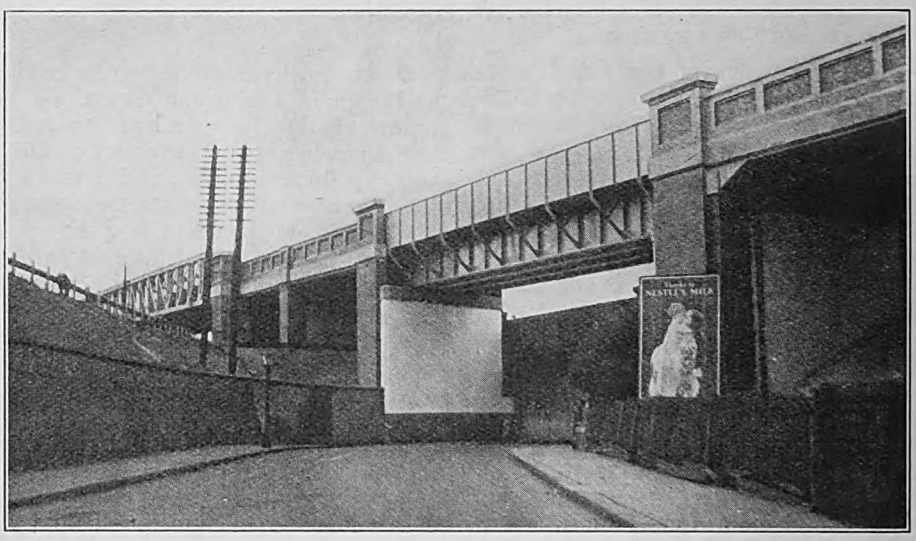
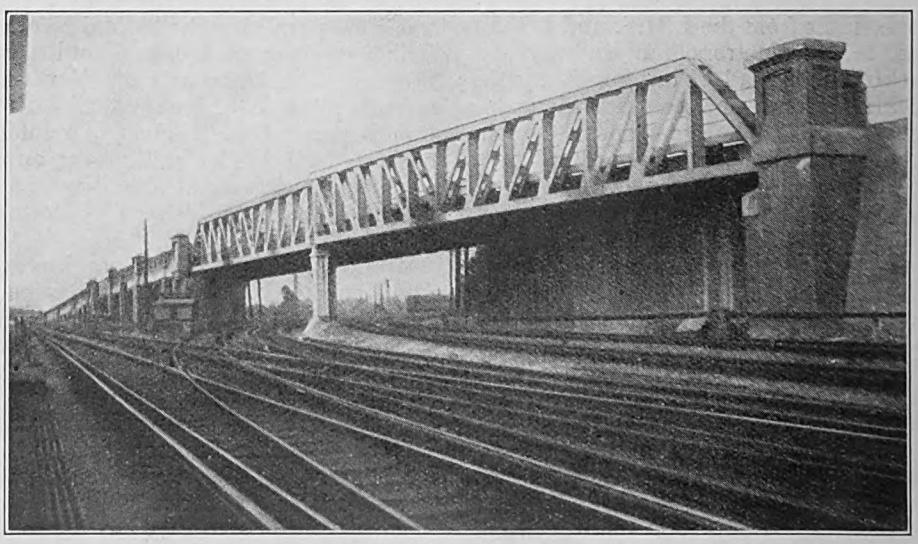


NEW BRIDGE OVER THURSTON ROAD.



BRIDGE OVER MAIN LINE LOOKING SOUTH.

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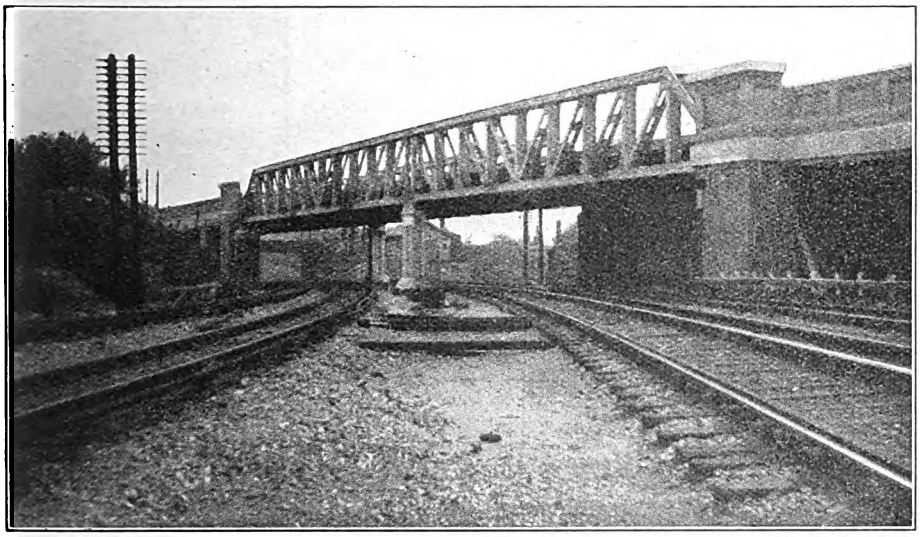
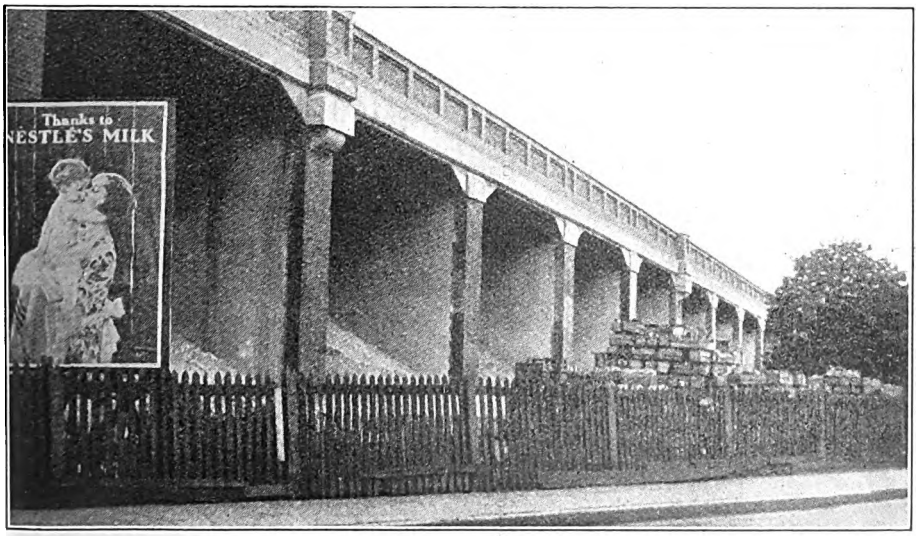


BRIDGE OVER MAIN LINE LOOKING NORTH.



VIADUCT ALONGSIDE MID-KENT LINE.

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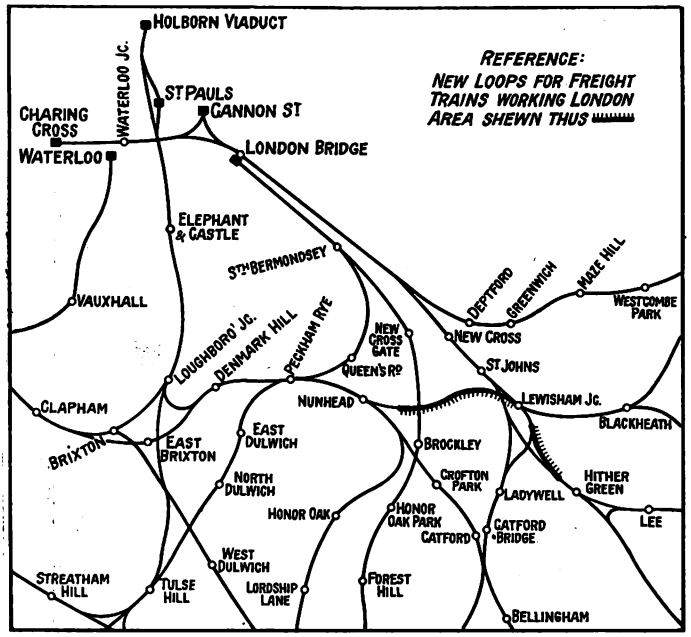

SKETCH MAP SHOWING RAILWAY ROUTES IN LONDON BRIDGE AND NEW CROSS AREA.

This Map also indicates the location of the new Lewisham loops recently brought into use.

Ladywell, Hither Green and Blackheath. Two new cabins of the latest design have been erected, one immediately south of the old Greenwich Park line bridge, the other farther down the main line at the point where it crosses the Mid-Kent.

The new loops were brought into use on July 7 of last year, concurrently with the introduction of the summer train services.

NOTES ON THE JANUARY NUMBER.

"The January issue was most interesting to us in Scotland, but there are one or two statements therein that I venture to question. On page 9 it is stated: 'Quite a number of expresses call . . . sometimes at Falkirk High or Manuel to make connections. . . .' One or two expresses from Glasgow to Edinburgh, or *Vice versâ*, call at Falkirk, but they do not make connections; and no such train calls at Manuel. (See article in the January, 1927, number on 'Edinburgh and Glasgow Routes of the L. & N.E.R.') The 8.25 p.m. ex Queen Street now carries a Pullman car (described as an 'ordinary' express on p. 10); similarly with the 5.5 p.m. ex Waverley, due Queen Street 6.14.

[The article was written some time ago, and in the course of revision did not cover quite all the recent developments. The reference to Falkirk and Manuel connections was a general one, and we accept Mr. Birkett's comments.—Ed. *R.M.*]

The Lauder trains use a bay on the up side, not the down, at Fountainhall, and the line goes in a south-easterly, not north-easterly, direction. The 5.45 p.m. ex Aberdeen is a Midland as well as East Coast express. I agree with Mr. Allen that running is always poor between Arbroath and Dundee. It is interesting to note that, commencing this month, an extra train in each direction is running on Sundays between Waverley and Aberdeen. *Re* fastest speeds on British railways, the public booked time of the 7.45 a.m. from Nairn to Forres (11 miles) is 13 minutes—*i.e.*, over 50 m.p.h. Doubtless this is not the working time, but it has been the public time for years. May I congratulate you on the fine view of Culloden Viaduct. *Re* paragraph on p. 499 of December issue, dealing with a lecture on the Highland line, the track is double from Blair Atholl (35 miles from Perth), over the summit (Druimnachdar, 1,484 feet, see the *R.M.* for January, 1923), to Dalwhinnie (58 miles from Perth and 5½ from Druimnachdar) From Dalwhinnie to Daviot (9 miles from Inverness), the line is single, but is being doubled south of Newtonmore. Summit boards have been erected at Slochd Mhuic (1,315 feet, 19 miles south of Inverness). Doubling of the track is also in progress at Moulinearn, near Pitlochry."

[Eric R. Birkett.]

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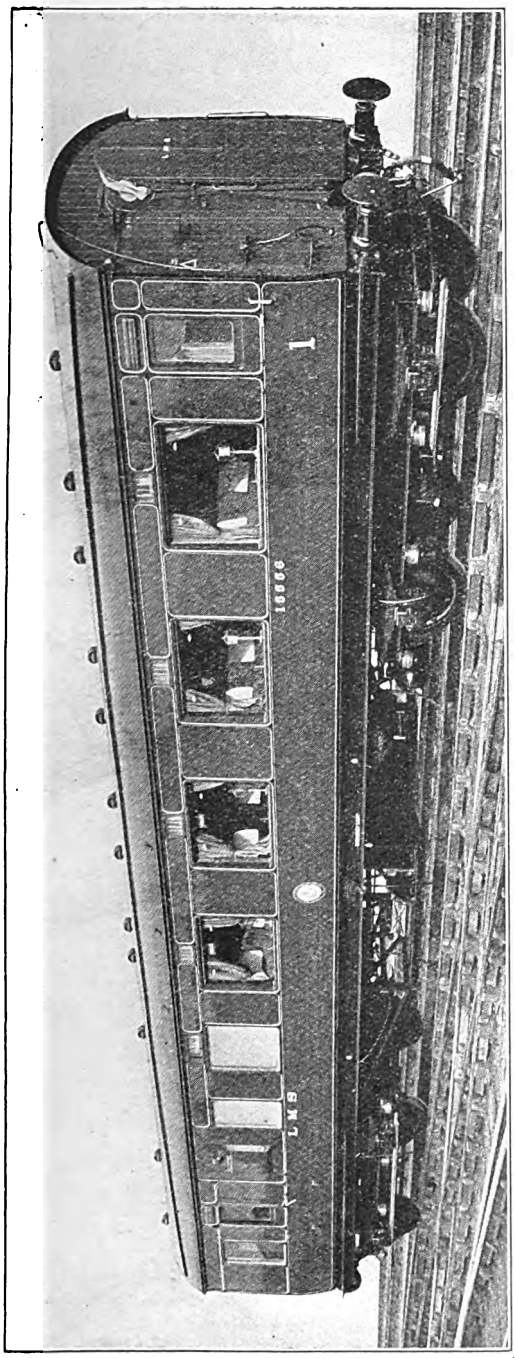
New First-Class Carriages, London Midland and Scottish Railway.



BY the courtesy of Sir Josiah Stamp, President of the London Midland and Scottish Railway, we are now enabled to reproduce some photographs of new first-class carriages recently placed in service by Mr. E. J. H. Lemon, Carriage and Wagon Superintendent, London Midland and Scottish Railway.

The design and appearance of the exterior walls of the carriages have been greatly improved and new lines imparted to them by means of deepening the windows, which are larger than usual ; this has dispensed with the waist line, and the exterior lower panels being of steel, timber mouldings have been done away with.

The cars are painted crimson lake, and suitably lined with black and gold, relieved with vermilion. The interior of the cars is composed of four compartments, a lavatory and brake van. The corridor, which links all the various compartments, has Westinghouse heaters built into the walls, and concealed by neatly designed flush metal covers, harmonising with the other metal fittings. A comfortable Wilton carpet covers the floor, and the walls are panelled with Indian greywood. There is ample ventilation. In the coach which we inspected and the style of which is, we believe, carried out throughout the whole range, each of the four first-class compartments was finished in a different style, one being panelled in greywood with furnishings of bluish grey and metal work in satin brass, the next compartment being carried out on Chippendale lines with satin wood inlays in carefully selected mahogany. In this compartment blue carpet was used and formed a pleasing contrast to the decorative upholstering, and in this case silver metal finishing is employed. The next compartment was panelled in walnut, and to suit the character of this timber, trimmings of blue face-cloth are used, while the colours of the timber and trimmings are tastefully

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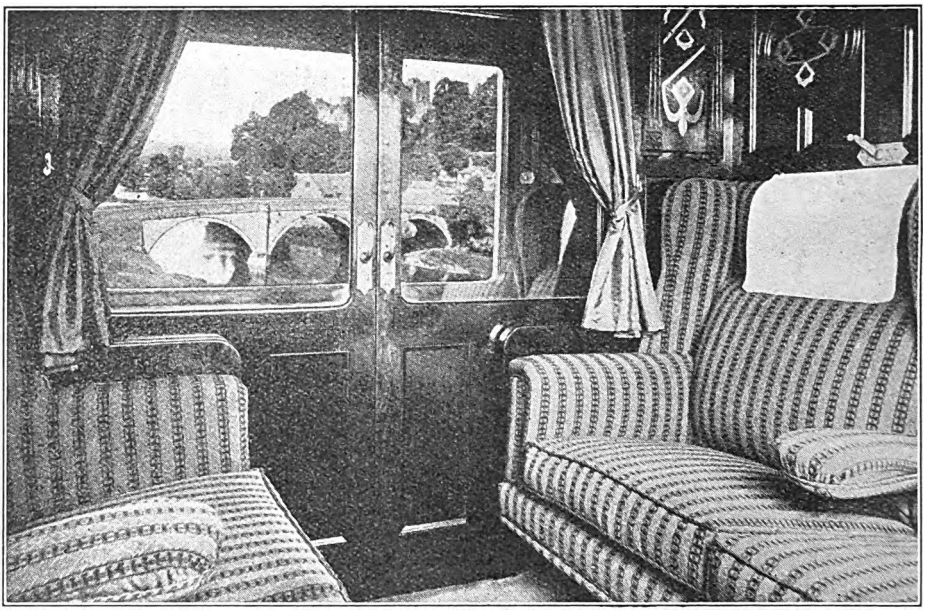

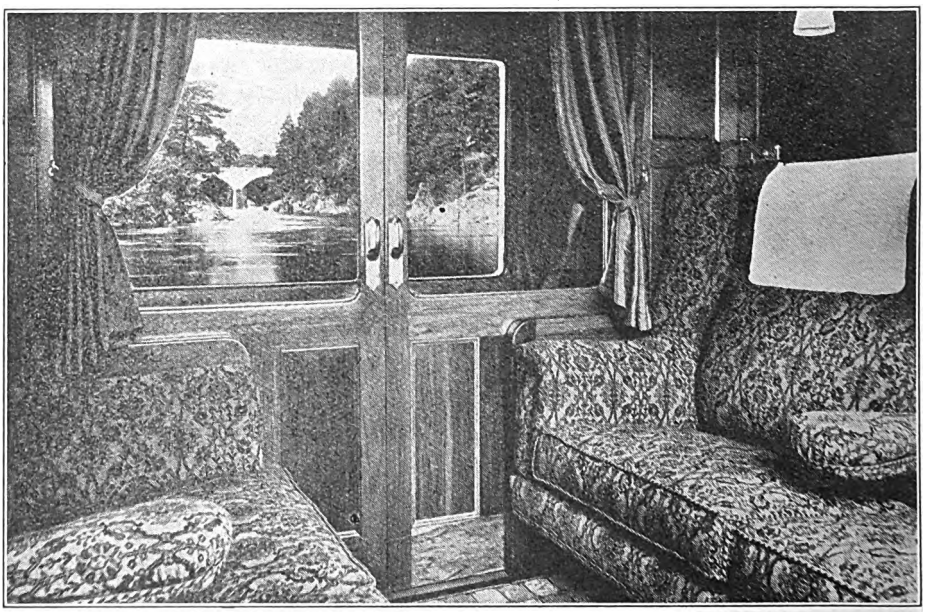

TWO EXAMPLES OF COMPARTMENT UPHOLSTERING AND EQUIPMENT

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repeated in a specially woven hand-loom rug. Oxydised silver fittings are here used. Heavy mouldings and massive inlays, old English oak treated and moulded into shape, characterises the fourth compartment, producing a replica of an old 16th-century room. Rose pink trimmings and lantern lighting complete the ensemble.

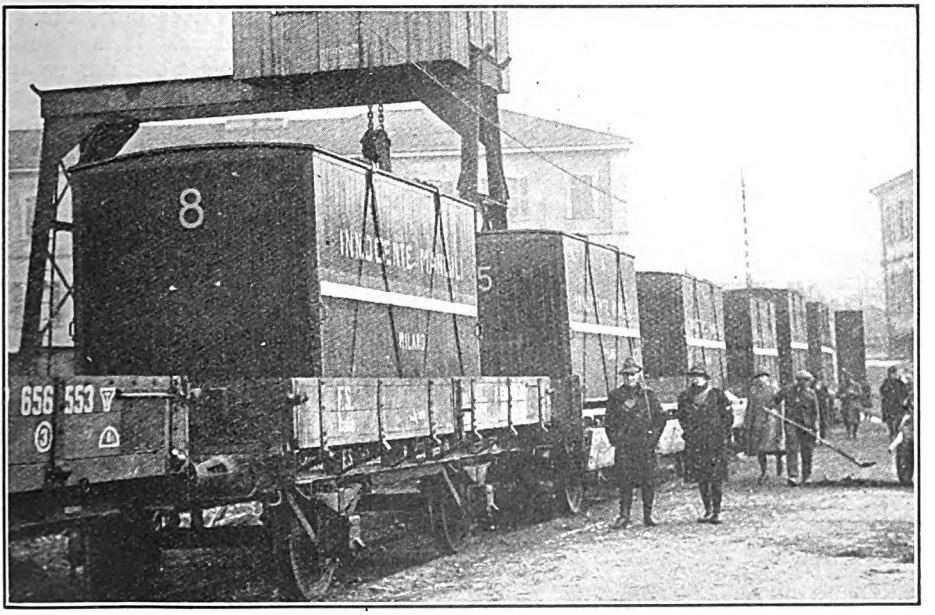
The carriages are electrically lighted, and each compartment has a table lamp, with an attractive shade of pink Rayolite. The lavatory, of ample dimensions, has its walls furnished with green Vitrolite, relieved in black. All compartments, including a large full-length mirror, add to the comfort of a journey.

The principal dimensions of the carriage are as follows:—

Length of body	.. ..	57 ft. 1 in.
Width of body	.. ..	9 ft.
Centres of bogies	.. ..	40 ft. 6 in.
Bogie wheelbase	.. ..	9 ft.
Buffer height	.. ..	3 ft. 5¼ in.
Weight of coach	.. ..	29 tons.

These vehicles rank among the most handsome yet introduced on any British railway, and one of the most interesting and valuable features is undoubtedly that of the large window spacings on both sides, giving an excellent view of the surrounding country as the train passes along. The introduction of sliding doors with large windows on the corridor side and the heating of the corridors, thus preventing the ingress of cold air to the compartments when the doors on that side are open, adds to the comfort and attractiveness of the coaches.

TRANSIT BY CONTAINER OF ITALIAN WORKS OF ART.



LOADING UP FOR TRANSIT FROM ITALY TO LONDON

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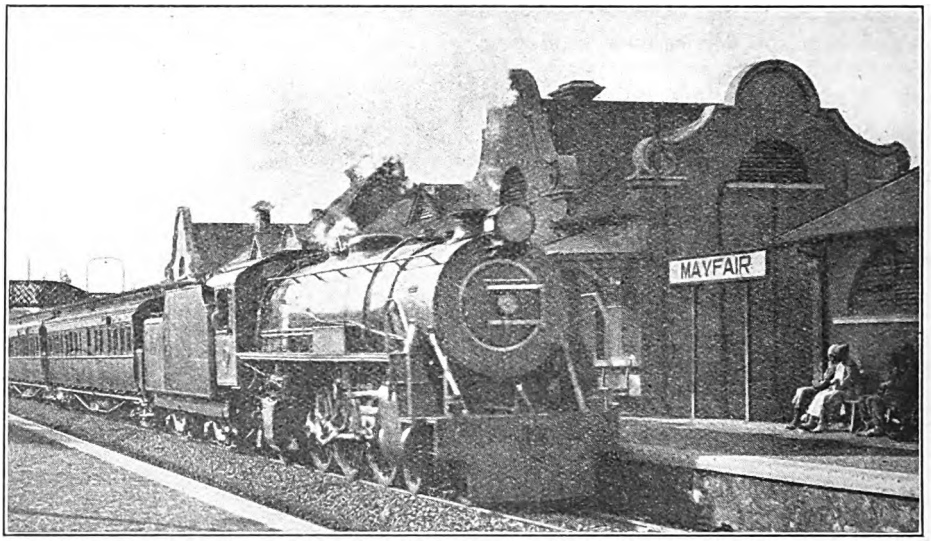

Photo.] "UNION LIMITED" EXPRESS PASSING MAYFAIR. [*I. E. J. Austin.*
Baldwin 4-6-2 Locomotive.

Railway Travel in South Africa.

By W. N. M. GREENWELL.

TO those of us who are accustomed to the short railway journeys of this country the prospect of one lasting for several days and nights would seem to sound the depths of weariness.

In practice, to anyone with a spark of imagination, it is a wonderful experience. Take, for example, the journey from Cape Town to the Victoria Falls, a matter of over 1,600 miles. One leaves Cape Town on the Wednesday afternoon and arrives at the Falls midday Sunday. Nearly four days and nights on the train. Let me try to take you this journey and describe what I saw a short time ago.

We, my wife and I, booked our accommodation on the train several days in advance. Our Cape Town hotel porter takes our heavy luggage to the station where it is given into the charge of the officials, who give us in return a receipt; we are not troubled with it until we reach the Falls.

Our hand luggage, containing necessaries for the journey, is taken on to the platform about half an hour before the departure of the train. On the platform is a notice board and on it are our names with the number of the coach, and the letter of the compartment set aside for our use. We quickly find this and enter and take stock of our little home for the next few days. It is about the size of half a first-class corridor compartment on the English railways, complete with wash-bowl with running water, mirrors, racks and clothes pegs and a folding table. The seat is leather covered, on account of the dust, and at night the back is lifted up and fastened to the roof to form the top bunk, while the seat itself forms the bottom one. Electric lights are conveniently set so that at night we are able to read in bed with comfort. Lavatories are on each coach, and even shower baths may be had.

On time to the minute we slowly steam out of Cape Town Station, passing through the suburbs, where we see many manufactories bearing familiar English names. Soon these are left behind and we are out in the country. As we have been in South Africa only a few days there are many novel sights to claim our attention, such as bullock wagons, Cape carts, &c., and, of course, numerous natives.

Soon after 4 o'clock afternoon tea is

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served, either in the dining car or in our coupé. While we are taking this, let me tell you of the arrangements for meals on the train. At about 6.30 a.m. we start the day with early morning tea or coffee. Having thus energised ourselves, we rise and dress in time for breakfast at 8 o'clock ; this can be taken either in the dining car or in one's own compartment. At 11 o'clock comes tea again ; this mid-morning tea is general all over South Africa. Lunch at one, afternoon tea at about four and dinner at seven. By buying the tickets in advance these five meals can be had for 8s. 6d. They are all well cooked and a splendid variety is offered, with a great abundance of fruit. In between these meals the train stewards come round selling fruit, sweets, ice-cream, &c., while the bar is open until 11 p.m. for the sale of tobacco, cigarettes and all kinds of drinks.

By the time that we have finished our afternoon tea we have left all traces of civilisation behind and can see in the distance the wonderful range of mountains, the Drakensteins. Unfortunately, it grows dark as we enter the Tulbagh Kloof, so that we do not see as much of this as we should like. After dinner we survey the wonderful African night from the observation platform at the end of the coach. The great searchlight on the front of the engine shows how we are winding up and up to those high tablelands for which Africa is noted. After a time we return to our coupé to find that the beds are made up for the night. Each person has a bundle of bedding done up in a canvas bag ; this bedding, which consists of sheets, blankets and pillows, is put on racks in the compartment during the day and is retained throughout the journey. It comes to each passenger freshly washed and sterilised. The beds are very comfortable and, after much practice obtained on board ship, we find no difficulty in falling asleep in our novel surroundings.

By breakfast time next morning we find ourselves crossing the Karoo, a very desolate stretch of country that, however, contains many interesting features, among which are several blockhouses, reminders of the Boer war. They seem to be in first-class condition and look, from the train, as if they had only recently been built.

After passing through many towns, whose names are familiar to us by reason of the aforesaid war, we come to Kimberley soon after 7 p.m. By seven the next morning we come to Mafeking, and then we begin to feel that we are now getting to the "back of beyond." The train stops at each siding and crowds of natives come alongside to sell skins, bead bags, carvings and other native-made curios. Away from the influences of civilisation, in his native dress or rather undress, one sees the African at his or her best. It is when he gets a white man's discarded vest or other garment, which he persists in wearing until it falls off his back, that he is an unlovely object.

We have now reached the region where the driver and guard of the train are the chief news carriers. They convey all the latest gossip from one station to the next, and at each siding are gathered groups of whites eager to hear news of the outside world. At each siding where the train stops for coal and water we get down to stretch our legs and view the surrounding bush at close quarters. Time flies so quickly that before we realise it it is again night. The bushes on the side of the unfenced line are, in parts, ablaze with some species of glow-worm, which seem to rival the stars in the heavens above. The next morning we reach Bulawayo, where we spend a few hours before getting into the Rhodesian train to complete the last stage of our trip. Another night and half a day through wonderful bush country and we come to the end of our journey with regret. A collection of railway buildings, a police camp and a palatial hotel, and, as for the rest, the untouched African bush and the Victoria Falls—the wonder of the world.

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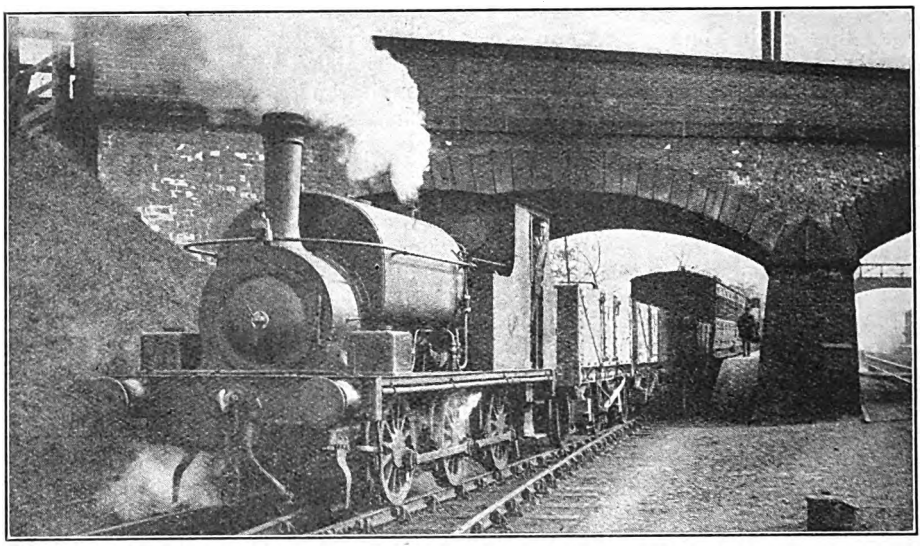

Photo.] TRAIN LEAVING ALNE FOR EASINGWOLD. [*L.N.E.R.*

The Easingwold Railway.

By W. HADFIELD CRAVEN.

TUCKED away in the pleasant Vale of York, nestling just beneath the brow of the famous Hambledon Hills, is a little railway, a mere thread on the fair face of the County of Broad Acres, that possesses the distinction of being the shortest standard gauge passenger line in the British Isles. Grouping has left independent those undertakings the magnitude of which is such as not to interfere with the working of the giant system adjoining, and so the tiny Easingwold Railway preserves its identity amid the stupendous submersions of once far greater companies.

Incorporated on August 27, 1887, and opened July 27, 1891, having cost about £17,000 to construct, the Easingwold Railway represented the expression of the good townspeople of the time towards the advancement of science ; prior to its inception, the two thousand-odd population of this busy little agricultural township were connected with the outer world only by a horse-drawn carrier, which ran three times daily between Easingwold and Alne Station, two and a-half miles away on the main line of the old North Eastern Railway. As might be imagined, the freight rates imposed by so primitive a conveyance did not lend themselves to the increase in business and personal advancement so much desired by all, and no less popular among the people of Easingwold, and, accordingly, it is with no surprise that we learn of the inhabitants getting together and forming and subscribing to a company with a capital of £12,000, promoted to provide and conduct their own railway facilities—no surprise, that is, other than that so remote a population should have so thorough an appreciation of the benefits conferred by steam locomotion, when more advanced communities had not many years before ridiculed the idea of the railway's usefulness and debarred it from their boundaries.

There is another distinction possessed by the Easingwold Railway besides that of its miniature proportions. It is a true light railway, built to the 4 ft. 8½ in. gauge, the track laid on the level surface of the land, with rails, of the Vignoles pattern, spiked direct to the sleepers—and all this well before the passing of the Light Railways Act, the terms of which its construction anticipated.

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If you take the train from York, which is distant some 13½ miles by road, Alne is reached in about 22 minutes, the intermediate stops being at Beningborough (which used to be called Shipton) and Tollerton. The Ouse is left behind at the northern extremity of Clifton Ings, not far from pretty Poppleton, and away to the left are the hills of West Yorkshire and the heather of Blubberhouses Moor and Harrogate and Aldborough, the Roman *Isurium*. To the north is the White Horse at Thirsk and the Hambledons. Ahead of us falls the even, fruitful Vale of York.

At the back of the up platform at Alne Station awaits the little train of the Easingwold Railway—"Over the bridge for Easingwold," is the instruction of the collector on the down side as I alight.

Its engine is not yet in position—it is busy collecting up the sundry merchandise vehicles that always compose part of its load. An interesting little busybody this engine as it flits about, glorying under its designation of "Easingwold Railway Company, No. 2." It is a saddle-tank locomotive, built in 1903 by Messrs. Hudswell, Clarke and Company, of Leeds, and has six coupled wheels of 3 ft. 3½ in. diameter, cylinders of 13-in. bore by 20-in. stroke, and a working pressure of 150 lb.; its coal and water capacities are one ton and 550 gallons, respectively, and its weight empty is just over 20 tons.

You may search the railway over for "Easingwold Railway Co. No. 1"—not a very long job that, you say. As a matter of fact, no engine so styled ever existed. The first Easingwold Railway locomotive bore the name *Easingwold*; it was a smaller, though elder, sister of the present machine, being built by the same makers in 1891, and having cylinders of 12-in. bore by 18-in. stroke, and wheels of 3 ft. 1 in. dia. It was last seen working at Sculcoates, Hull, a quarter of a century ago during the building of the new station there, having passed into the hands of a firm of contractors.

The train consists of two ex-North London Railway coaches, repainted a sombre brown, the one uniform with 50 second-class seats, the other composite with room for 10 first and 20 second-class passengers and a guard's brake. The guard himself is chatty as he snips my ticket, a ticket closely resembling those of the London and North Eastern Railway in type and hue, but proudly flaunting its owners' title.

Presently, the engine and wagons being coupled up, the train moves off, curving sharply to the right. It rocks not a little, and "Easingwold Railway Company, No. 2" puffs the while as if the whole weight of the world's traffic were hitched behind her. It has a curious sound of its own, that one and only Easingwold Railway train. Travel by it, and you will hear it.

Heading now north-east by east, a level crossing is passed over, and, soon afterwards, a stream is crossed by a bridge of about 10-ft. span—a stream which ultimately reaches the North Sea by way of the Kyle, the Ouse and the Humber. The country around is level, rich farmland—there is but a short stretch of 1 in 100, the steepest gradient. Perhaps halfway to our destination a second road is crossed on the level.

I have before me as I write a copy of the Easingwold Railway Act of Parliament of 1887; the exact description of this, the Company's "main" line, contained therein makes quaint reading:—

"A Railway (No. 1)"—Nos. 2 and 3 are the sidings and spur connecting with the North Eastern main line at Alne—"two miles three furlongs and four chains in length commencing in the parish of Alne at the northern fence of a field belonging or reputed to belong to William Severs and occupied by Jane Hutton Prest at a point eighty yards or thereabouts measured along the said fence from the highway leading from Alne to Easingwold and terminating on the southwest side of Long Street in the town and parish of Easingwold at a point in a garden belonging or reputed to belong to and occupied by John Buckle distant twenty yards or thereabouts in a westerly direction from the door opening from the said garden into Long Street aforesaid."

Two miles and thirty-seven chains from Alne Station we come to rest at the single platform at Easingwold, "Easingwold Railway Company, No. 2's" handbrakes grinding us to a standstill, the journey being scheduled for accomplishment in eight minutes, a figure often exceeded when the load of merchandise is heavy.

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The total length of railway owned by the Company is 2 miles 77 chains, the remaining 40 chains being in sidings, of which there are three lines at Easingwold and one at Alne on the up side of the London and North Eastern Railway, and in the junction at Alne.

Dismounting from the train, a survey of the station reveals a roomy yard, busy enough; shedding for goods and engine, the latter a little way up the line; a weigh office; and the rather unkempt terminus buildings. At the gate of the station yard, where once stood the doorway to John Buckle's garden in all probability, is the end of Long Street, the main thoroughfare of this little town, which, incidentally, is known for the manufacturing of steels used in making cutlery, and which possesses a market place, two acres in extent; to the south-east is the ancient City of York; 10½ miles to the north-west is Thirsk; and the ridge of the Hambledons looms up barely three miles on the northward.

Before the war nine trains ran daily in either direction between Easingwold and Alne, connecting with north- and south-bound trains on the main line; to-day the service has been reduced by three trains each way, and the timing is as follows:—

York (dep.)	a.m. 7.48	a.m. 8.40	noon 12.0	p.m. —	p.m. 3.10	p.m. 5.12
ALNE (dep.)	8.10	9.6	a.m. 12.27	1.38	3.42	5.47
E'WOLD (arr.)	8.18	9.14	12.35	1.46	3.50	5.55
E'WOLD (dep.)	a.m. 7.36	a.m. 8.34	a.m. 11.5	p.m. 1.15	p.m. 3.15	p.m. 5.0
ALNE (arr.)	7.44	8.42	11.13	1.23	3.23	5.8
York (arr.)	8.9	9.11	11.40	1.51	—	6.18

These trains run on weekdays only, there being no Sunday service. Up till a few years ago extra trains left Alne for Easingwold at 10.40 a.m. and 7.18 p.m., and on Saturdays only there was one at 11.20 p.m., connecting with a rail motor 'bus from York. In the reverse direction additional trains left Easingwold at 10.15 a.m. and 6.45 p.m. All of these have, however, been discontinued. The fare is 6d. first class and 4d. second.

The coaching vehicles described comprise the entire rolling stock of the Company; there are no goods vehicles, all such being supplied by the London and North Eastern Railway, on whose lines merchandise from Easingwold must inevitably run. Potatoes form the district's chief export, with live stock as runner up.

At Easingwold there is a stationmaster, a clerk, and perhaps four porters; the Company's staff is usually brought up to a total of 12 by means of two drivers, one fireman, one guard and two platelayers. The original Secretary and General Manager was a John Hetherton, an accountant, of York; he was succeeded in 1893 by Edward Buller Hicks, who held the joint post until the appointment of the present officer, G. H. Coates, in 1926.

It is interesting to notice, in conclusion, that the Easingwold Railway was instituted to combat horse-drawn omnibus traffic and has proved a comparatively successful venture, paying a dividend of either 3 or 4 per cent. for a number of years. Nowadays it is the petrol-driven 'bus that is the deadly enemy of the light railway, and, indeed, a sore thorn in the side of the gigantic combines, yet, withal, this tiny train continues to steam merrily between Alne and Easingwold, lost in the rolling acres of the Vale of York.

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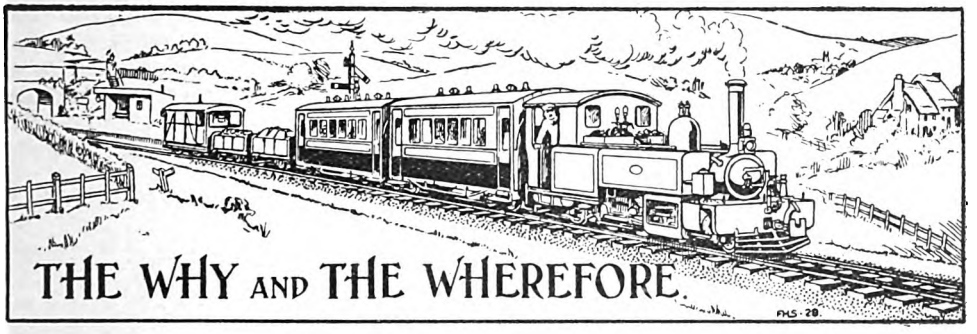

RAILWAY MAGAZINE *readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to the dimensions and weights of railway rolling-stock and to names, numbers, dates, &c., of locomotives should not be forwarded. No reader should send more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history or "grouping," the pages of the "Railway Year Book"* (5s. *net*) *should be consulted. The thirty-second Annual Edition* (1929) *of this standard railway reference work is now published. All previous Editions are out of print.*

Side-Lights on Brake Vans.

The original purpose of side-lamps at night, on the last vehicle of a train, in addition to the ordinary tail-lamp, which is carried by day or night, was to enable a triangle of lights to be shown, and so to distinguish as clearly as possible between train tail-lights and the lights of signals. Where three or more parallel tracks were in use, various rearrangements of tail-lights were laid down, according to the particular line in use by the train concerned, so that there should be no risk of drivers imagining the tail-lights of a train to be on the track ahead of them, rather than on a parallel track. Again, the side-irons in use for side-lamps enabled the latter to show a white light forwards, as well as a red light backwards, so that a driver could assure himself, from time to time, that the whole of his train was following. Where you have observed side-lamps attached to other than the last vehicle of the train, it has probably been because the tail of the train has been made up with horse-boxes, carriage-trucks, or other vehicles not fitted with irons for carrying side-lamps. Since the war, however, for purposes of economy, there has been considerable relaxation of the rules regarding side-lamps, and the G.W.R. appears to be the only remaining company to keep them invariably in use.

[Reply to "BANBURIAN."]

Continental Cars at Market Harborough.

Mr. D. O'Donoghue, of Leicester, writes: "I have noted, on several Sundays during the summer of 1928, trains of three coaches removed from their wheels and carried on wagons, the wheels being loaded in separate wagons and an ordinary coach attached next to the engine for the use of railway and the makers' workmen. The journey from Birmingham to Peterborough, with stops for examination at Rugby, Market Harborough, Seaton and Wansford, occupied about 10 hours. The load was carried out of gauge, and the slow speed was due to this and the necessity for avoiding heating of the wagon journals, which, however, did occur on one or two occasions. At Wansford the load was slewed back to centre."

[Further reply to R. M. HYSLOP.]

Through Trains between London and North Eastern and Southern Railways.

Express engines cannot work through from King's Cross *via* Farringdon and Snow Hill to the Southern Railway, partly on account of insufficient clearances, and also because of their inability to condense while passing through the Metropolitan tunnels. The scant clearance just referred to is chiefly in the matter of height, and the restrictions on rolling stock are not, therefore, so severe

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as apply in the case of locomotives. We have no information as to the exact stock used on the occasion of the through excursion from Peterborough to Hove on November 30, but the route followed would be either the one just mentioned, the train passing from Eastern to Central Division metals *via* Blackfriars and London Bridge ; or through by the Great Eastern route from Peterborough to Liverpool Street and thence by the East London line to New Cross. The London and North Eastern engine would probably be changed at Finsbury Park or King's Cross in the former case, and Liverpool Street in the latter, tank engines being used from there to New Cross, where the Southern engine would be attached for the remainder of the journey.

[Reply to " B. O. P."]

Harringworth Viaduct, London Midland & Scottish Railway.

Mr. D. O'Donoghue, of Leicester, writes: " This viaduct extends from between mile-posts 85 and 85¼ to between 85¾ and 86, and is thus approximately ¾-mile in length. As stated, the height is not considerable, probably about 60 ft., although I believe there is a slight rise at either end due to gradients. Normally, about 130 trains, including 20 expresses, pass over the viaduct daily. The block section from Harringworth to Wing Siding includes the viaduct and two tunnels, one of which is a mile in length, also three overbridges crossing the L. & N.W. section (Peterborough branch).

———

Mr. G. Staff sends the following notes: —The dimensions are: ¾ of a mile in length ; 82 arches of 40-ft. span ; the 81 piers are 6 ft. thick, except 10, which are double thickness and are called block piers ; average height 57 ft. ; the work contains 20,000,000 bricks, 2,000 cubic yards of concrete and 19,000 cubic feet of stone. These particulars are taken from a book called *Life and Work among the Navvies*, by D. W. Barrett, M.A., Vicar of Nassington, 1879 ; it gives a full account of the making of the line from Manton to Kettering.

[Further reply to " F.M.S."]

Portmeadow Halt, London Midland & Scottish Railway.

Mr. E. J. Norris mentions that when he was at school near Oxford in 1919, this halt was closed, but shortly afterwards was re-opened for the use of motor trains.

———

" Bicestrian " states that this was advertised publicly as a halt for rail motors for many years. He suggests that this service between Oxford and Bicester was started about 1904. The rail motor did not run beyond Bicester. Port Meadow, originally named Summerfield, was the first stop out of Oxford. " Widgeon " states that the halt was closed after the general strike of 1926, but was reopened for a time in connection with trials of a Sentinel-Cammell coach.

[Further reply to " ROWINGTON JUNCTION."]

Through Coaches, St. Pancras to Manchester (Victoria).

Through coaches from St. Pancras to the Victoria Station at Manchester do not normally travel *via* Stockport, but, after passing Marple, continue by the straight line from Romiley Junction to Reddish Junction, and thence to Ashburys, L.N.E. (G.C. Section), immediately after which they diverge to the right through Ancoats Junction and St. Philips Park Sidings to Miles Platting, L.M.S. (L. & Y. Section) and Victoria. Only in the case of the midnight train from St. Pancras is the Manchester (Victoria) portion run into Stockport, Tiviot Dale, *via* Bredbury Junction ; at Stockport it is reversed, and, running *via* Brinnington Junction, regains the route previously mentioned at Reddish Junction.

[Reply to G. B. GREY.]

The Natal Zululand Routes.

We have not heard of any railway actually called the Natal Zululand Railway, but the official Year Book of the Union of South Africa records that " The Zululand Railway Construction Act, No. 31, of 1924, authorised the building of a railway from Matubatuba (Natal north-coast line) to the south bank of the Pongolo river, 88 miles, at an estimated cost of £419,760. The Railways Construction Act, No. 35, of 1926, pro-

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vided for an extension to the Swaziland border, a distance of 5 miles, at an estimated cost of £67,356. The entire line was completed and opened for public traffic on July 4, 1926."

[Reply to C. P. GRIGGS.]

Lentz Valves.

No engines of the L.N.E.R. "Sandringham" class are fitted with Lentz valves, as you state; their use is confined to a number of the G.E. inside-cylinder 4-6-0 engines, a number of the 3-cylinder 4-4-0 engines of the "Shire" class, and one G.E. 0-6-0 type locomotive. A detailed description, with drawings, of the Lentz gear on No. 336, *Buckinghamshire* (which includes the Lentz motion as well as the poppet valves), appeared in the issue of our contemporary, *The Railway Gazette,* for November 29th last. Your other query is not sufficiently explicit to permit of reply.

[Reply to BM/CB8H.]

5.50 p.m. Manchester to St. Pancras.

You are correct in assuming that the 5.50 p.m. from Manchester (Central) calls at Cheadle Heath (6.3-6.8 p.m.) for the purpose of attaching the through coaches which leave Liverpool at 4.55 p.m. The 12.20 p.m. express at one time stopped at Cheadle Heath for the same purpose, though not shown to do so in the public time-tables ; but in the latter case the through working has now been abandoned, and the stop is when required to pick up passengers only. We have no information bearing on your other query.

[Reply to W. ASH.]

Locomotive Terms.

A "capuchon" is the raised lip fitted to the front half of the chimney of certain engines, with the idea of causing the smoke and steam to rise better above the boiler and thus not obstruct the driver's view. The term comes from French practice. A pony truck is a kind of two-wheeled bogie, usually working from a pivot, whereas a radial axle is fitted in an axle box, which allows a certain amount of sideways movement in a radial path, but without any connection to the centre of the radius adopted.

[Reply to L. J. PARRIS.]

Norwich to Portsmouth by L.M.S. and S.R.

In the absence of definite information it is impossible to say actually which route was followed. Presumably, the journey was made *via* the M. & G.N. Joint line to join the Midland section, and thence to Leicester and *via* Rugby to Willesden Junction. This excursion working was operated on July 6 last, the train being due at Addison Road at 5.22 a.m. Possibly a reader can confirm or provide an alternative explanation.

[Reply to "ROUNDABOUT."]

Uxbridge Station, Great Western Railway.

The fact that there are two stations used by Great Western Railway trains at Uxbridge is due to the fact that one is the terminus of the old branch from the main line, while the other is the terminus of the branch put in in connection with the Great Western and Great Central Joint line. Presumably, it was not practicable to bring the latter trains into High Street station.

[Reply to "NORTHERNER."]

7.45 a.m. Express, Bristol to Paddington.

Schedule times of this train are Bath 8.1-8.3, Chippenham 8.21-8.26, Swindon (pass and slip) 8.47, Steventon (pass) 9.7, Didcot 9.12-9.17, Reading (pass and slip) 9.37, Twyford (pass) 9.43, Maidenhead (pass) 9.49½, Slough (pass) 9.55, Southall (pass) 10.4, and Paddington arrive 10.15 a.m.

[Reply to J. A. PRESS.]

Disused Line in Nottinghamshire.

Though we have noticed the disused line crossed by viaduct between Kimberley and Nunthorpe Stations, on the London and North Eastern Railway, Pinxton branch, we have no knowledge as to its history. Possibly some of our readers can supply information.

[Reply to E. O. FOX.]

1.30 and 1.40 Expresses from King's Cross.

Scheduled passing times of the 1.30 p.m. down Leeds express, London and North Eastern Railway, are Hatfield 1.55, Hitchin 2.9 and Huntingdon 2.34

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p.m. The 1.40 p.m. passes these points 11 min. later. No passing times are scheduled at Finsbury Park.

[Reply to J. T. HOLMES.]

Distances between Stations.

We can in no circumstances give in these columns lists of stations and the distance between each. Such information can be obtained without difficulty from *Bradshaw's Guide*.

[Reply to J. T. HOLMES and others.]

Fletcher Locomotives, N.E. Area, London and North Eastern Railway.

We believe that the last of these engines have now been withdrawn from service. They were of the "901" 2-4-0 tender passenger, the "398" 0-6-0 tender freight and the 0-4-4 "BTP" tank type used in the working of push-and-pull train services.

[Reply to J. T. HOLMES.]

Locomotives of French Northern Railway.

A large number of 4-4-0 compound express locomotives have been used by this system and worked the chief express services prior to the advent of the de Glehn "Atlantics." We believe that a number of them are still in use on duties of secondary importance.

[Reply to J. M. INNES.]

RAILWAYS IN THE NEAR EAST.

ON January 6 the Railway Club held its monthly meeting at 57, Fetter Lane, E.C.4, when Mr. A. S. G. Walsh gave his paper on "Notes on Railways of the Near East," in which he described his experiences when travelling from Egypt to Turkey. The route followed by the author was from Kantara, on the Suez Canal, to Ludd, where the Jaffa-Jerusalem line is crossed, thence to Haifa, then to Damascus, Rayak (junction for Beyrout), Aleppo, where the line from Tripoli joins, and across Asia Minor to the Bosphorus. From Kantara to Haifa and from Tripoli northwards the line is of standard gauge. The remaining part, Haifa to Damascus, with branches, is of narrow gauge. The line from Haifa to Damascus crosses very hilly country, and is unsuited for heavy through traffic. As an alternative to widening to standard gauge, a line has been proposed along the coast from Haifa to Tripoli, in order to complete by standard track the overland route to Egypt. Through passengers to Egypt now follow this route, covering the coast gap by road motors. On the narrow gauge is found the lowest station in the world, Somach, which is to the south of the Sea of Galilee, and is about 660 feet below sea-level.

The first line to be opened was the Jaffa-Jerusalem section; this is of French construction. Then came the Beirut-Damascus, Haifa, round the Sea of Galilee to Damascus (the Hedjah Railway), and the "Pilgrims" line southward from Damascus, east of the Dead Sea, to Medina, and intended to reach Mecca. This is a continuation of a German-built line from opposite Constantinople across Asia Minor to Aleppo and Damascus, a line which, until the very end of the war, had a gap across the Taurus Mountains. The "Pilgrims" line received continuous attention from Colonel Lawrence and his Arabs during the war, and has never been put into running order since. The war saw another Turkish line, since dismantled, constructed. This ran from Ludd on the Jaffa-Jerusalem line, southward to the frontier, and was later connected by the British to their Rafa-Beersheba line. The British built, to support the Army advancing into Palestine, the "Milk and Honey" line from Kantara, on the Suez Canal, along the coast to Rafa, Ludd and Haifa, and a branch, since dismantled, from Rafa to Beersheba.

Along the author's route there is much desert, especially after leaving Kantara, and also across Asia Minor. The best scenery by far is to be found on the narrow-gauge section which traverses the Palestine mountains. As might be expected, the train services over the whole route are very scanty. The Kantara-Haifa has one train each way daily, a restaurant and sleeping-car train. From Tripoli and Aleppo northwards, four trains a week. The "busy" sections, Jaffa-Jerusalem, Haifa-Samach and Damascus-Rayak, have about three trains a day. Damascus possesses three stations. The rolling stock on the restaurant-car trains is quite good, and is hauled by fairly modern engines, but there are to be found a number of antiques, both among engines and rolling stock. During the war a number of L.S.W.R. and L.N.W.R. 0-6-0 goods engines found their way into Palestine, some of which are still to be found at work.

The paper was followed by a short discussion, and proved of considerable interest to members.

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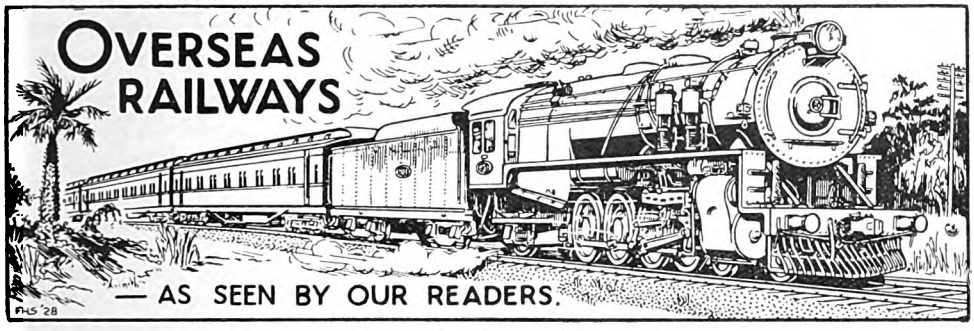

Correspondence for this section, with or without photographs, is invited.

The Rheingold Express.

WITH reference to Mr. G. S. Duncan's letter in your January issue, I travelled by this train twice last July—once from Mannheim to Düsseldorf and once from Karlsruhe to the Hook of Holland. On the first occasion it was on time at Mannheim, exceeded the 2 mins. allowance at Mainz slightly, was delayed outside Köln, and also exceeded its 6 mins. allowance in that station, and was about 4 mins. late at Düsseldorf. The second time it arrived at Karlsruhe 8 mins. late, spent a full 4 mins. in the station at Mainz, recovered several minutes before Köln, and by travelling from there to Düsseldorf in exactly 30 mins. arrived at the latter station on time, and was on time or ahead of it for the rest of the journey. Maximum speed was about 65-66 m.p.h., which was maintained for several kilometres between Köln and Düsseldorf. I believe loss of time here and there is by no means uncommon on this train, but it is usually able to recover any losses. Schedule speeds, of course, are not very high. The same engine travelled through from Mainz to the Dutch frontier. Water was taken at Köln. As Mr. Duncan says, the organisation is very good, but there are, of course, several quite important trains in this country with intermediate stops not exceeding 2 mins.—for example, the down "Riviera" at Exeter, the 3.20 p.m. from Marylebone at Leicester and Nottingham and Penistone, the down Thames-Clyde express at Leicester, the up Glasgow-Tilbury boat train at Trent (after only 3 mins. at Leeds!), the "Queen of Scots" at Darlington—but there is no need to go on. The cars used on the Rheingold, by the way, are very heavy, varying from 52 to 54 tons. Ball bearings are used. Rather curiously, the largest class of 4-6-2 engines are rarely used on this train.

[C. E. TURNER JONES.]

Scandinavian Railways.

YOU state, on page 418 of the November number, that the railway opened in Norway on September 1, 1854, was "the first in the whole of Scandinavia." This should have read, "the first on the Scandinavian peninsula." The first railways in Scandinavia were built in Denmark, the two first being Altona-Kiel (that part of Germany then belonging to Denmark), opened in 1844, and Copenhagen-Roskilde, opened in 1847.—[J. STEFFENSEN.]

Visp-Zermatt Railway.

I NOTICE in the December issue a paragraph by Mr. G. Scott, stating, with reference to my contribution on the subject in the November number, that the Visp-Zermatt Railway was steam-worked in September last. In this connection I can only say that it was in August that the official *inauguration* of electrc traction took place, and photographs were published in Swiss newspapers showing one of the new electric locomotives arriving at Zermatt, alongside an old steam locomotive. It must, therefore, be supposed that regular electric working could not be commenced immediately—possibly because the new engines were not all delivered. If I hear of anything new in this respect, I will certainly let you know.—[H. G. UNDERWOOD.]

With reference to Mr. G. Scott's note on page 482 of the December issue, it may further interest your readers to know that I travelled through to Zermatt on August 26 last and returned on September 7, and on both the up and down journey I passed a fully loaded passenger train drawn by an electric locomotive. The electric system was obviously in working order, but I was given to understand at Zermatt that at that date only one electric locomotive had been delivered.—[A. F. KING-STEPHENS.]

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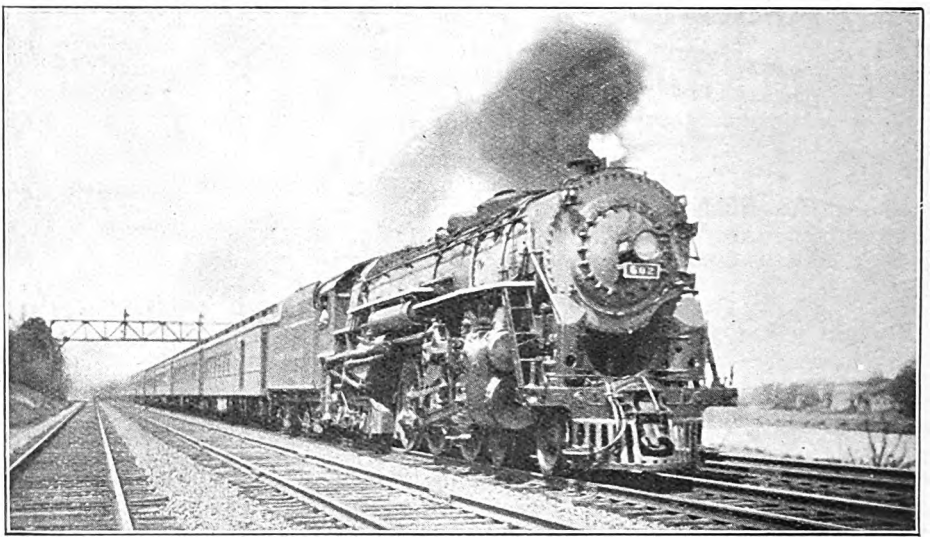

Photo.] [*Arthur Curran.*

"WESTERN EXPRESS," BOSTON AND ALBANY RAILROAD, 4-6-4 No. 602.

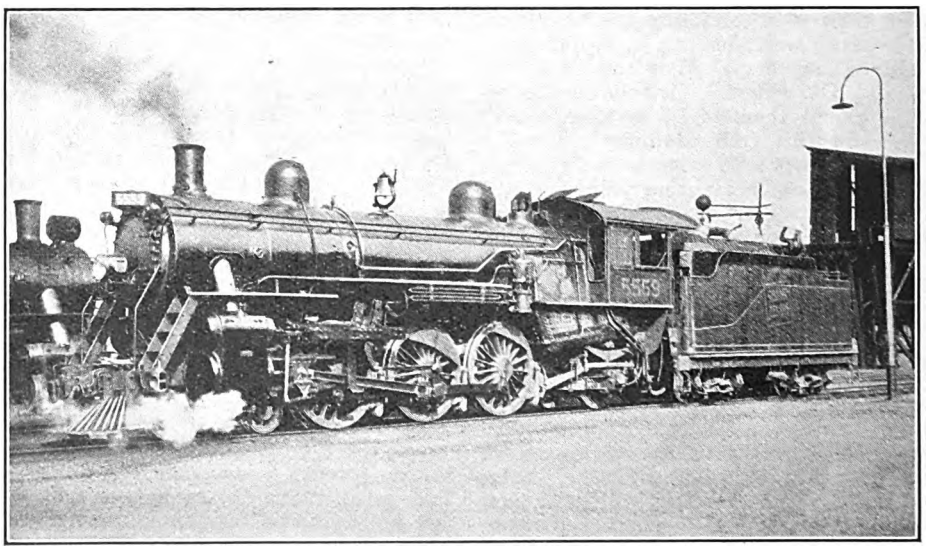

Photo.] [*Arthur Curran.*

4-6-2 No. 5559, GRAND TRUNK RAILWAY, CANADA.

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Improving Appearance of American Locomotives.

ONE of the interesting results of the Baltimore Exhibition—at which the G.W.R. engine *King George V* played such an important part—is to be found in the fillip which it gave to the movement toward an improvement in the appearance of locomotives, both in the States and in Canada. In addition to this, however, it has encouraged the habit of keeping existing engines reasonably clean. The accompanying photograph, showing 4-6-2 No. 5559 of the Grand Trunk Railway, illustrates this point. The result is the more creditable in view of the dust, which, in dry weather, is difficult to control in the north-eastern States which the G.T.R. penetrates. Even on lines ballasted with trap-rock, the dust will rise, somehow, and powder the running-gear of rapidly moving trains. In the wake of a train moving at, say, 60 m.p.h., the cloud will rise to a height of 15 or 20 feet.—[ARTHUR CURRAN.]

Colours of American] Railway Rolling Stock.

GREEN, or greenish-black, seems to be still the favourite paint for passenger equipment cars in America. The Chicago & Alton's fast six and one-half hour train between Chicago and St. Louis, "The Alton Limited," has cars of a rather purple-red hue, with lettering in gilt. The Alton's 3 p.m. "Lincoln Limited" out of Chicago to St. Louis also has similar equipment. The Wabash operates a competing train with the Alton between Chicago and St. Louis, known as the "Banner Blue Limited," which is painted in blue, with gilt lettering.

The Pennsylvania Railroad has used red cars for its passenger equipment so long that "Pennsylvania red" is almost a household term. All standard fast trains of the Pennsylvania, day coaches as well as sleeping cars, particularly those which operate on the system proper, are exclusively made up of cars of this colour, and they are very striking in appearance. On many trains of the Pennsylvania system that are for travel off the lines, particularly south of Washington, the usual greenish-black car that seems so popular in America is often made up with other "Pennsylvania red" cars.

The Chicago & North Western has a rather pleasingly bright yellow colour for its coaches, but the "Overland Limited," "Los Angeles Limited," and several other of its famous trains running via Union Pacific, west of Omaha, use the standard greenish-black coloured cars. The Chicago, Milwaukee, St. Paul & Pacific has a standard orange colour for passenger equipment; a red band and gilt lettering is used in showing the road's name. These cars are very pleasing in appearance. It is difficult for a seasoned traveller not to associate yellow or orange cars with Duluth, St. Paul and Minneapolis. The Norfolk & Western (serving Columbus, Cincinnati, Old Point Comfort and Norfolk) has a red very similar to the Pennsylvania.

The Canadian Pacific uses red equipment on its cars, but I believe this equipment is not standard; at least, in the yards at Toronto both red and greenish-black cars were in evidence. The new "Crescent Limited" between New York and New Orleans, operating via Pennsylvania Lines, Southern Railway, Atlanta & West Point, and Louisville & Nashville, has an exterior of two shades of green, with the very newest designed Pullman equipment. The Detroit-Cincinnati "Motor Queen," on the Big Four, and the "Niagara Falls De-Luxe" coach train of the Michigan Central are newly-designed coach trains of the New York Central Lines, with single seats.

Railroads are attempting to keep travel by attractive new designs of cars, and making all sorts of innovations. With the motor-bus and the airplane coming into the field of passenger service, railroad men are beginning to feel that every effort must be made to appeal to the travelling public.—[P. F. LANING.]

Notes on French and Swiss Railways.

HAVING recently returned from a short holiday in France and Switzerland, I though a few notes might be of interest to your readers. I travelled to Bâle direct by the Swiss Day Express from Boulogne. After Amiens I saw many traces of the war. All station buildings appear new, while in many places the line has been re-laid on a new formation alongside the old. At St. Eulien the sidings are still full of heavy guns mounted on bogies. At Bâle the change from steam to electric traction is effected, most of the electric locomotives being of the 4-8-2 type, with some 4-6-2's. The unequal number of carrying axles is, I believe, found to give steadier riding. The locomotives start very smoothly, quite as well as the best steam practice. A number of steam tank locomotives to be found at Bâle and elsewhere shunting closely resemble the North London 4-4-0's, but, of course, have much more external gear. The local trains are formed of 6-wheeled coaches, and all include a Post Office van at the front. Much foreign stock is to be seen at Bâle, chiefly German

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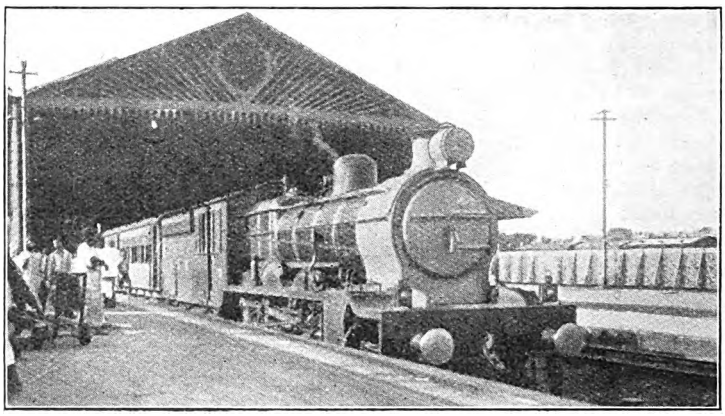

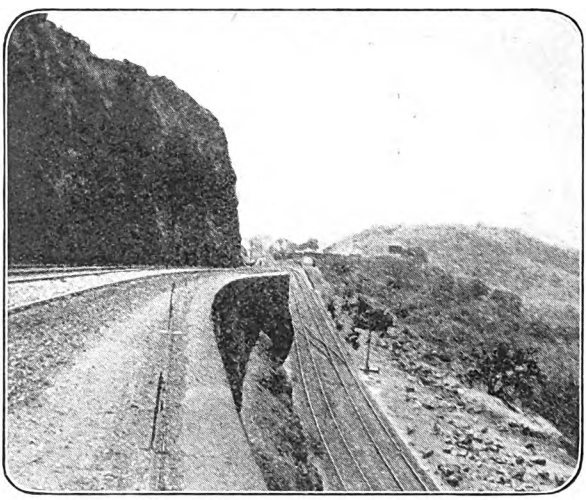

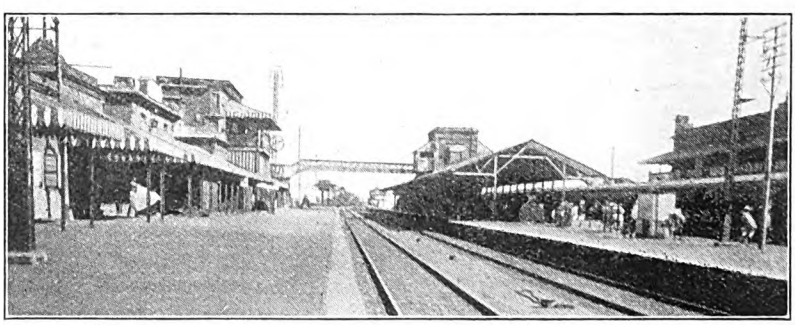

1. 4-6-0 No. 780 ON M. & S.M.R. TRAIN.
2. REVERSING STATION ON ZIG-ZAG.
3. ASANSOL STATION, EAST INDIAN RAILWAY.

Photos. by B. D. Sullock.

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State and Mitropa, with Est and Nord of France also.

The Swiss railways are relaying with steel sleepers on all the main lines, in contrast to the Germans, who, after a trial, are removing theirs. The ballast and general appearance of the permanent way is very good. The stations are chiefly notable, apart from their magnificent architecture, for the absence of barriers, all ticket inspection being done on the trains. At the principal stations separate platforms for luggage and staff are provided on the opposite side of each track to the platform for passengers, an excellent idea which greatly expedites matters. Returning from Lucerne, on September 19, the journey was chiefly notable for the sight of two accidents in the course of a few hours. The first was at Olten, between Lucerne and Bâle, where a goods train had caught fire in the Lower Hauenstein Tunnel (length 8,939 yards), and so damaged the track that, after much delay, our train had to be worked through on the wrong line with a pilotman, quite in the English fashion. An accident of this nature must be unusual with electric traction, but apparently the strong draught had fanned some trucks of manure. The second mishap was more serious, and occurred at Altkirch, in Alsace, which I reached about 2.30 p.m. A goods train had been in a serious collision, apparently with a passenger train. The goods locomotive was lying on its left side, several goods vans were badly smashed and telescoped, while some damaged passenger coaches were standing in a siding. The 11.37 a.m. Lucerne to Paris becomes the "Suisse-Voges Rapide" after Bâle. A curious legacy of the German occupation is that the trains run on the right-hand line, as in Germany, reverting to the normal at Montreux-Vieux by means of a diamond crossing. These two incidents resulted in the train leaving Belfort 23 minutes late, but the whole of this lost time and another minute in addition were regained before Troyes, and time was kept thence to Paris. My return to London was only remarkable for the fact that the English train, in charge of E858, travelled *via* Canterbury and Chatham.—[G. L. GUNDRY.]

REFERRING to Mr. H. E. Underwood's interesting notes, included in the November issue of the *Railway Magazine*, on page 389, on what he saw on the P.L.M. Mt. Cenis line in May last, I must say that the main line (Culoz-Modane) is to be equipped all over with the 3rd rail system (and not with catenary wires); that is why your correspondent has seen between stations "not the slightest" trace of concrete blocks which form the base of post sustaining wires. And, if he saw wires near stations, it is because overhead catenary wires are only to be put a quarter of a mile each way of an important station and on the sidings in order to avoid electrocution of men charging or discharging wagons. I must add that the line will be electrically operated from Chambéry to Modane for the summer service of 1930; the section Culoz-Chambéry later on.—[R. V. HAPPE.]

Railway Travel in India.

I DID a very interesting trip recently on an engine on the 10 miles between Kasara and Igatpuri, on the G.I.P. main line. This section, known as the Ghat section, takes the railway from the narrow coastal plain round Bombay, up over the Western Ghats on to the Deccan plateau. The line itself, a fine piece of engineering, is very steep. There is one very high viaduct, and about six tunnels, mostly unlined, and blasted out of the solid rock. The train was the Punjab mail, consisting of ten coaches, and was worked by two 2-10-2 side-tank engines, one in front, and one in rear, which worked backwards to prevent the driver being blinded in tunnels. The gradient varies but little, and the engines plug away for the whole distance at 14 m.p.h. without change of regulator or cut-off setting. The engines had very big boilers, and seemed to have no difficulty in maintaining the 180 lbs. of steam, as several times during the run the front engine was blowing off. When this occurred in tunnels, combined with the sharp exhaust beats of the engine, the noise was deafening. Catch points, connecting with long uphill runways, are provided at several places, and there are two block signal cabins on the way up. The line from Bombay to Igatpuri is shortly to be electrified, as has been done on the Poona section with such success, and the foundations for the overhead wire standards have been laid most of the way. This should speed up the service considerably, as at present a steam worked train takes 43 minutes to do the 10 miles.—["MACAW."]

Notes on Belgian Railways.

IN connection with the query raised by a correspondent in the November issue of the *Railway Magazine* as to the ultimate fate of the American 4-6-0's, known as "Spiders," which were in use during the war in France, Mr. D. S. Barrie writes:—

"Quite recently I noticed, while at

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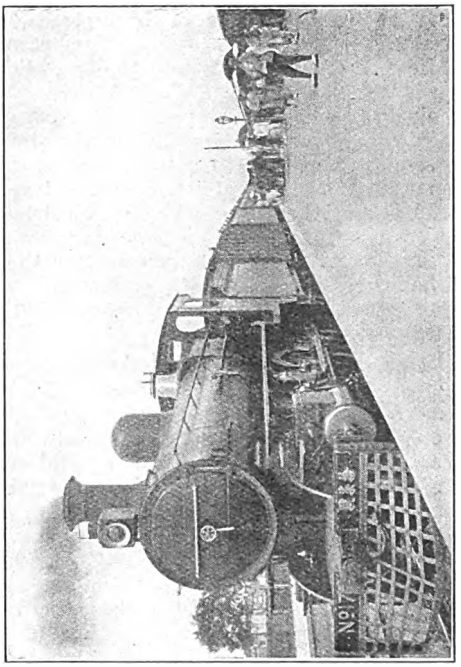
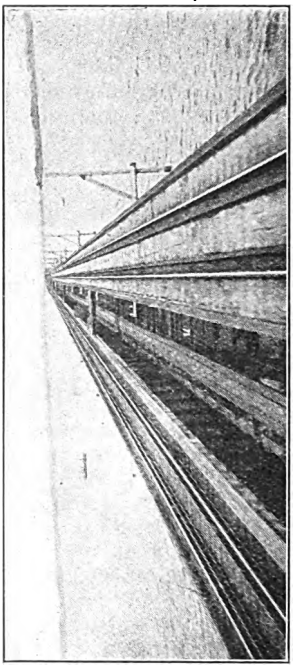
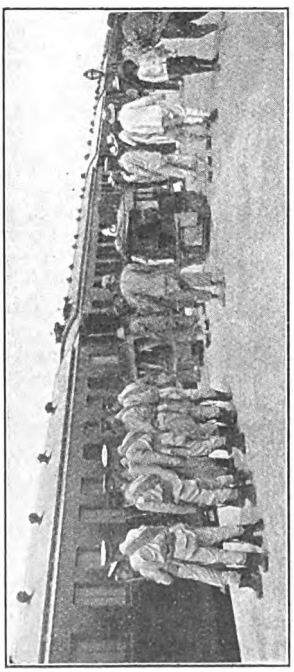
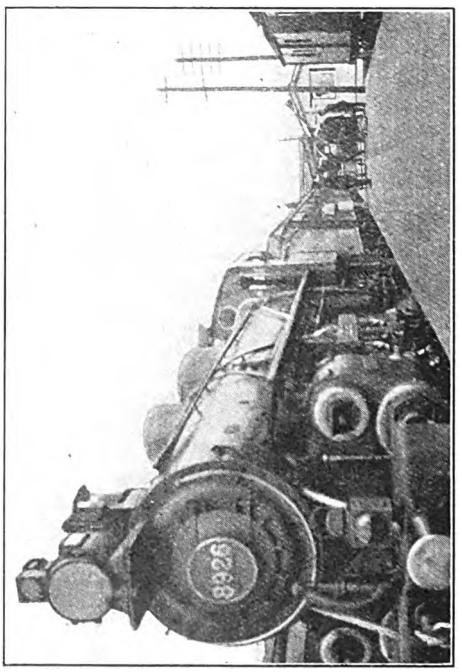




2. TRAIN ON THE PUKOW-TIENTSIN RAILWAY.

4. VIEW FROM OBSERVATION CAR ON TOKIO-SHINOMOSEKI EXPRESS WHILE CROSSING LAGOON.





1. STATION ON PUKOW-TIENTSIN RAILWAY SHOWING USUAL GUARD OF SOLDIERS.

3. TOKIO-SHINOMOSEKI EXPRESS AT NAGOYA.

RAILWAY SCENES IN CHINA AND JAPAN.

(Photos. by Rev. J. S. Caddick-Adams.)

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Ypres, one of the Baldwin 4-6-0's referred to. It had brought in a train from Bruges, of about 16 carriages, and was still very American in appearance. In an extensive tour of the Western and Northern sections of the Belgian State Railways this was the only engine of this type which I saw, but at the same station (Ypres) I saw an old 0-6-0 of quite evident North British origin, even to traces of the livery which still remained. I could not, however, find any N.B. number. It would be interesting to know what other ex-British engines are still to be found in France and Belgium as legacies of the war.

"The Belgian State Railways, which prior to 1914 possessed, I believe, less than 300 locomotives, are now blessed with a superfluity as a result of the peace settlement, their present stock of about 2,000 engines including a large number of ex-German locomotives. These, principally of 4-4-2 and 4-6-2 types, are used extensively on the main line services between Brussels, Ghent, Bruges and Ostend, and perform very creditable work with heavy trains.

"The 4-6-2 type, despite their weight and size, even work through from Bruges over the branch line to Heyst, although the 'Caledonian' type of 4-4-2T is more usually encountered on such duties. A peculiar feature of the Ostend traffic is that the huge Flamme 4-6-2's, which formerly worked through from Brussels on the heavily-loaded seasonal expresses from the capital to the Littoral, have now been diverted to the Eastern section and their place taken by the former German engines. At most of the principal locomotive depôts there is abundant evidence of the superfluity of motive power now available."—[D. S. BARRIE.]

Bruges as a Railway Centre.

ONE of the most interesting centres for the railway enthusiast in Belgium is the ancient and historic city of Bruges, which has now also claims to commercial importance. Bruges is the junction point for the south-west with the main line from Brussels to Ostend, and in the summer when the seaside resorts are busy the traffic is extremely heavy. The principal trains from Brussels, most of which stop at Alost and Ghent, convey through coaches from the capital to Blankenbergh and Heyst, and these vehicles are detached at Bruges and worked through by 4-4-2T's, unless the Heyst section is heavy enough to run as a separate train from Brussels.

The Blankenbergh and Zeebrugge line branches off from the Ostend route only a short distance from Bruges, the intervening section, which passes through a park and between two streets, providing excellent opportunities for observation. In addition to the intensive passenger traffic which prevails during the summer, there is a considerable service of freight trains, many of which are in connection with the L.N.E.R. train-ferry service between Harwich and Zeebrugge. It seems to be the policy of the locomotive department to resurrect its oldest and most venerable "crocks" for working the freight traffic, and one Zeebrugge goods which I saw, although totalling about 50 loaded wagons, had a very old Belgian 0-6-0 with high stove-pipe chimney, outside cranks, and a four-wheeled tender!

It is interesting to note that Belgium also is using steel sleepers, some of which I saw this summer in course of being laid between Ghent and Alost. Unlike the practice of our own railways, who appear to favour some anti-corrosion coating rather like black enamel, the sleepers in Belgium were already red with rust as they were being put down.—[D. S. BARRIE.]

American Railways in France.

COMMENTING on the item, on page 396 of the November issue, by G. T. Moody, I should like to say I once observed one of the American 0-4-0 saddle-tank engines at work in the yard of Crossley's oil engine and car works, between Manchester and Stockport. As one who worked on the American-built tank engines in France, I can say they were very powerful. The Nord Railway took over some of the 2-8-0 type before I left the country after the Armistice. I should be interested if any reader could give some idea of what became of the various American-built engines, also the petrol engines used on the standard railways. I was on one of the latter for a few months up to the time of the Armistice. So far as I know, four came out in 1916 and another five in 1918; one, I heard, was captured in the latter year. I was interested to find one of these engines doing the shunting work (or at least had been) at the Powell Duffryn Colliery, Llanharan, South Wales, when under construction in 1919. The day I saw her she was out of traffic with the same faults that troubled us in France, and a steamer was borrowed from a nearby colliery. According to its number, it was not one of those we had in France, but one of the new series, and presumably built but not shipped over. The engines were 180-H.P. Thornycroft, put in a four-wheeled coupled chassis built by Manning, Wardle & Co., of Leeds.—[J. BIRCH.]

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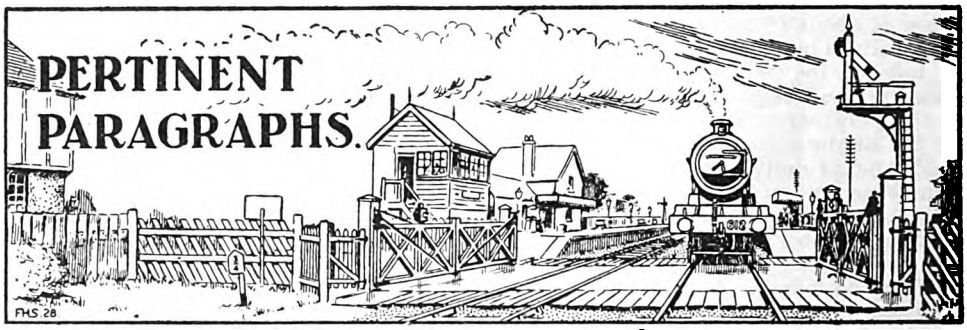

Further L.N.E.R. Improvement Schemes.

THE L.N.E.R. reports that under the Passenger Duty Capitalisation Scheme, the following works have been approved:—

Hull: New Goods Arrival Sidings.

The construction of new marshalling sidings on a site near the Priory Yard mineral sidings. The whole of the inwards goods traffic arriving at Hull will be dealt with in the new group of sidings, which will be served by six new reception lines, each capable of holding a train of 80 wagons. Trains arriving will be shunted from these new reception lines over a hump, and sorted by gravity into a balloon-shaped yard consisting of four groups of 15 sidings, each siding holding 60 wagons. The lighting throughout the yard will be by electricity. The provision of the new sidings will considerably expedite the shunting of freight traffic for various destinations in Hull and the immediate neighbourhood.

Mottram: Marshalling Sidings between Mottram and Dinting for Down Traffic.

This scheme includes new marshalling sidings consisting of eight reception tracks with a capacity of 80 wagons each and 20 shunting sidings with a capacity of 65 wagons each, to be provided on the down side of the L.N.E.R. main line, Marylebone-Manchester, between Dinting and Mottram. The proposal will considerably speed up the work of goods and mineral traffic passing between Penistone and Manchester.

South Lynn: Additional Sidings, Goods Shed Accommodation, &c.

This work includes the provision of a larger engine turntable, laying down of sidings, and construction of a goods shed to meet the needs of King's Lynn, which is extending in the direction of South Lynn. This proposal is being carried out in co-operation with the L.M.S.R. and should effect an improvement to the M. & G.N. Joint Railway.

Railway Questions in Examination Papers.

MR. P. A. CURTOIS sends an extract from an examination paper set by the Oxford and Cambridge Schools Examination Board, as follows:—"On May 9, 1904, a record-breaking mail train on the Great Western Railway travelled from Plymouth to London, taking 123¼ minutes for the 128⅛ miles from Plymouth to Bristol, and, after a stop of 3¾ minutes at Bristol, taking 99¾ minutes for the 118½ miles from Bristol to London. Find the average speeds in miles per hour (i) from Plymouth to Bristol, (ii) from Bristol to London, (iii) for the whole journey from Plymouth to London, giving your results correct to three significant figures." While we can sympathise with the candidates to whom the question meant the working out of three distinct calculations, it is of interest to note that the famous G.W.R. record run, of which particulars are given in "The Railway Year Book," was thus utilised.

Côte D'Azur Pullman Express.

ON Tuesday, December 10, the Paris, Lyons & Mediterranean Railway and the International Sleeping Car Company introduced a new day Pullman service to and from the Riviera. By this de luxe service, for which supplementary fees are charged, Paris is left at 8.50 a.m., and Nice, 675 miles, for example, is reached at 11 p.m., an average overall speed of approximately 48 m.p.h. The train comprises eight cars, three "couplages," each set seating 48 passengers and equipped with dining facilities, and brake vans at either end. One car is equipped with an "Electrophone" for the entertainment of passengers. This will indeed prove a wonderful service for those who prefer a daylight run to the Riviera—hitherto usually made at night—and should be very successful. The Pullman cars are magnificently decorated—mainly by MM. Lalique and

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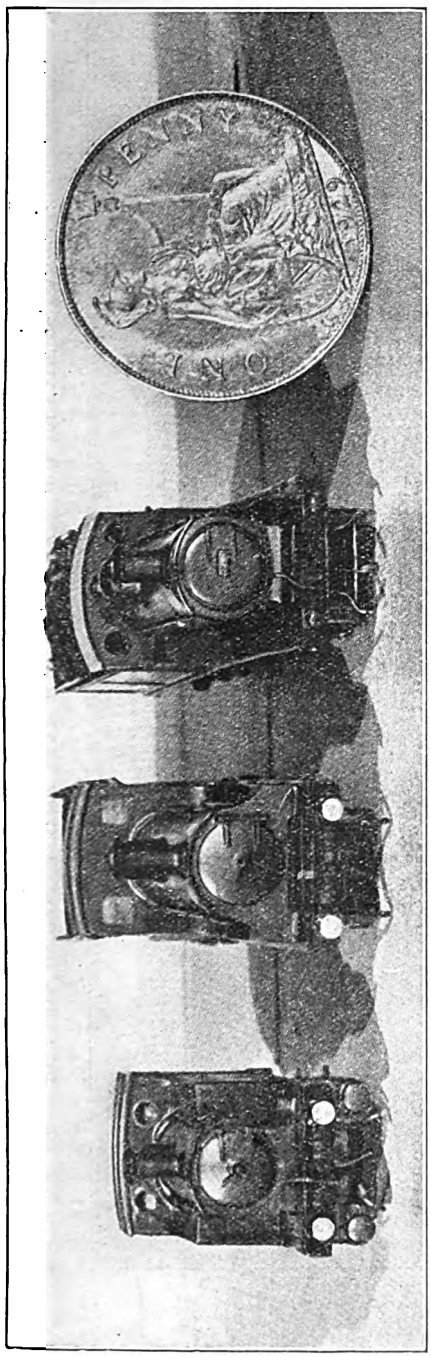
René Prou, in delicate moulded glass figures, and are most luxurious. They are specially designed for roominess of accommodation and smoothness of running, all seats being adjustable and movable.



[Fox Photos.

THREE MODEL ENGINES (BUILT BY MESSRS. J. H. LANGRIDGE AND A. WALKLEY) SHOWN AT THE RECENT WIMBLEDON MODEL RAILWAY CLUB EXHIBITION, COMPARED WITH A PENNY.

Photo.]

Everyday Locomotives.

In October, Mr. J. F. Gairns, Editor of The Railway Magazine, gave his annual talk to the Wimbledon and District Model Railway Club. Two prizes were offered for short essays upon the topic considered. On the last occasion the subject was "Everyday Locomotives," and the prizes were awarded to Mr. R. R. J. Plummer and Mr. J. Davis. The respective essays read as follows:—

Mr. R. R. J. Plummer:—

None of us pays much attention to the engine that hauls our business train in the morning—it is just an everyday locomotive. Generally, it is a commonplace tank engine or small tender engine, possibly one of a very numerous class, and even the most enthusiastic of locomotive enthusiasts bestows no more than a passing glance on it. Yet these everyday locomotives have their interest, especially if they are former express locomotives displaced by the steadily increasing train loading. There is always something rather pathetic about this. One sees early L.S.W.R. Drummond four-coupled engines on outer suburban trains, milk trains, and some of the "Grasshoppers" even on shunting work—still equipped with enormous eight-wheeled tenders. Great Eastern 2-4-0 engines of Holden's design, which once hauled Cromer expresses, are now met with on country services hauling antique six-wheelers, while L.N.W. George V class engines (surely one of the most well known of locomotive types) are rarely seen to-day even on the lighter expresses. On the other hand, we have engines which have no former glories to look back on, but were built for everyday duties. Excellent examples of this class of engine are the various types of 0-4-4 tank engine to be found on the late L.S.W.R. However, these now stand a fair chance of coming into prominence. Displaced in the inner suburban area by electrification schemes and on the longer runs by Ashford 2-6-0's, they will doubtless soon be finding their way to the scrap-heap. We shall then start talking of "those wonderful old South Western tanks," and proposals will doubtless be afoot for preservation of one of their number at York.

Mr. J. Davis:—Nowadays the tendency is to build 4-6-0 and even 4-6-2 locomotives for everyday purposes, though, at present, the 4-4-0 still holds its own. Principally on the L.M.S. are the ex-Midland compounds. These have been developed and built in large numbers since grouping by Sir Henry Fowler. The most typical mixed-

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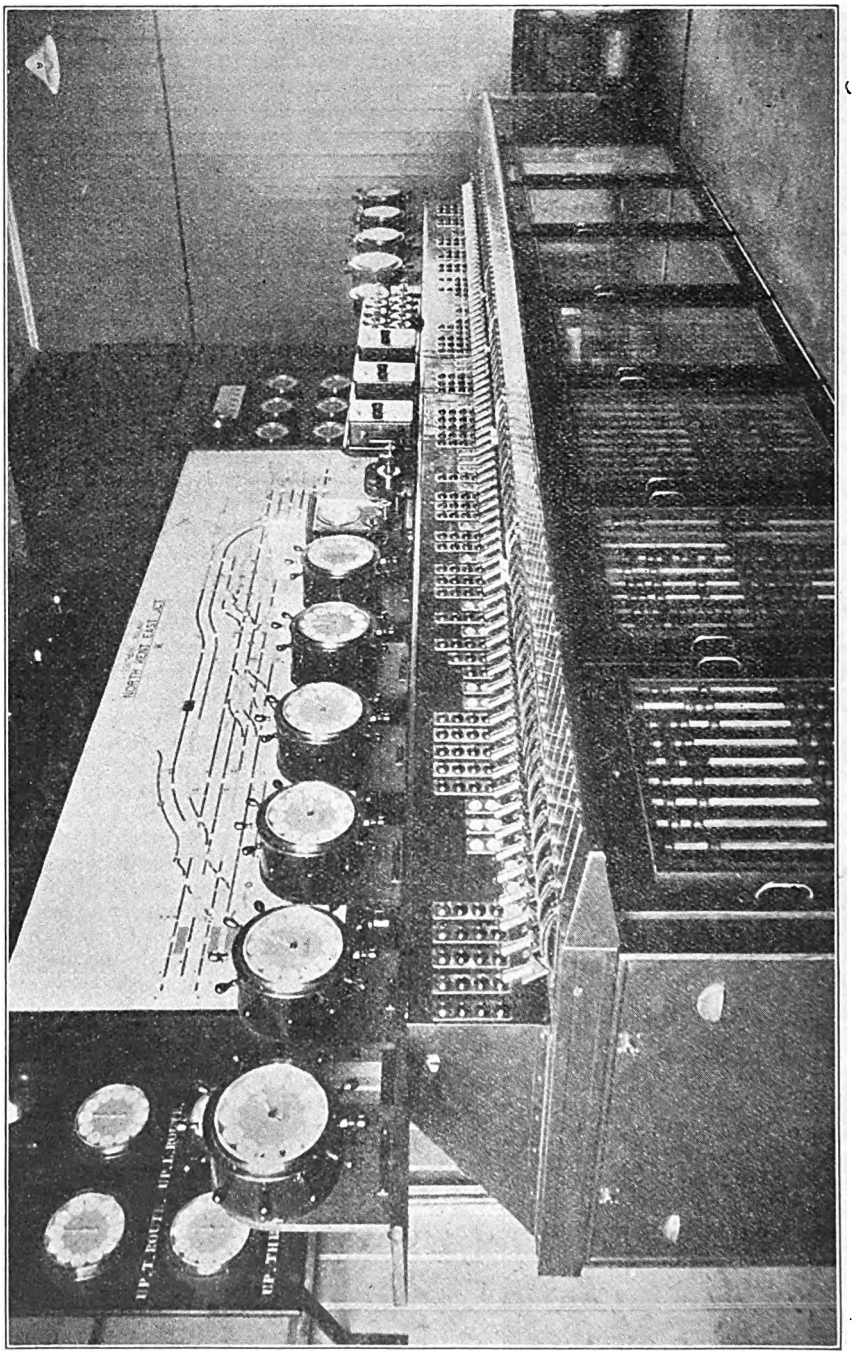

INTERIOR OF NORTH KENT EAST JUNCTION SIGNAL BOX, SOUTHERN RAILWAY. (*See page* 159.)

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traffic locos. on the L.M.S. may be said to be the "13000" class 2-6-0. These are now used in many parts of Britain. The L.N.E.R. also has a modern development of a pre-grouping design in the "Directors." Originally designed by Mr. Robinson for the old G.C.R., they are now in use in Scotland, as well as on their parent system. The G.W.R. has progressed more than any other of the groups; instead of a majority of 4-4-0's for everyday use, the 4-6-0 appears to be the type. Thus, in the modern "Hall" class, mixed-traffic locos. Here we have a development of much of the practice in use on the G.W.R. to make a mixed-traffic locomotive. Although at present there are not a large number running, many others have been ordered, which is a sure proof of their usefulness. Lastly, we come to the Southern. On the Western Section two classes immediately suggest themselves, the 4-4-0 mixed-traffic "F" class and the "K" class 0-4-4T. Both these are equally at home on either a secondary express, working a motor train or shunting in a goods yard. Thus we may take them to be real "everyday locomotives."

Railway Steamers.

MR. C. J. COGHLAN sends the following notes:—"During the past year or so British railways disposed of several of their vessels. The L.M.S. sold both the *Antrim* and the *Duke of Cornwall* to the Isle of Man Steam Packet Co., under whose flag they are now known as the *Ramsey Town* and *Rushen Castle* respectively. The *Duke of Cumberland* now runs on the Tilbury-Dunkerque service as the *Picard*, and the *Duchess of Devonshire* has become the *Gibel-Dersa*, owned by H. M. Bland, of Gibraltar. The L.M.S. also sold the paddle steamer *Queen Mary*, used on Loch Lomond, and the *Cleveleys*, built in 1902. The L.N.E.R. sold the old Harwich-Hook of Holland packet *Amsterdam* to be scrapped. This company also disposed of the paddle steamer *Blanche*, built in 1883, and the small vessel *Hull*, the latter being sold to a Chester owner. S.R. vessels sold include the old paddle steamers—used on the Portsmouth-Isle of Wight services—*Duchess of Albany* and *Princess Margaret*, built in 1889 and 1893 respectively, and the *Ulrica* to Dutch scrappers. The Isle of Man Steam Packet Co. purchased the turbine steamer *Victoria*, and did not change the name. It is rather interesting that the old *Laura*, built in 1885, should cross the Atlantic, being now owned by the Florida Inter-Island S.S. Co., Nassau, New Providence, Bahamas, the name not having been changed. The S.R. also sold the steam tug *Adur II* to the Shoreman Harbour Trustees."

Southern Railway Locomotives.

MR. T. H. DONOHUE writes:—"In answer to a correspondent who recently asked for the present whereabouts of the 'Lord Nelson' engines and 'King Arthur's,' Nos. 763-772: *Lord Nelson*, E850, is at Exmouth Junction shed, and works up to Waterloo on Mondays, Wednesdays and Fridays on the Atlantic Coast Express, returning on the following days with the same train. This duty is shared by E860, *Lord Hawke*, and E861, *Lord Anson*, of Nine Elms shed. Nos. E851-859 are at Battersea (Eastern shed) on Continental express duties. Nos. E763-772 are also at Battersea. Nos. E767, *Sir Valence*, and E769, *Sir Balan*, are kept for Continental express duty also, and still have their original 'King Arthur' type tenders; the other eight engines (E763-766, 768, 770-772) all have six-wheel tenders, and are now principally used on Brighton expresses and other heavy Central Section trains. They are, however, still regarded as available for Continentals if required, and (very occasionally) one or two of them may be seen on Western Section duty, especially if a trip to Eastleigh Works has been required. It is nothing very unusual to see one of these engines en route to Brighton or Worthing one day, and on a run to Dover or Folkestone the next, there being plenty of drivers available with experience of the 'King Arthur' type. No engines of this class ever have, or will, work regularly into Charing Cross on account of weight restrictions over the bridge; No. E453, *King Arthur*, soon after it first came out, did (as duly recorded in THE RAILWAY MAGAZINE at the time) make a trip to Folkestone and back on one day only manned by a Western Section crew and piloted by an Eastern Section driver—as was done when South-Western 4-4-0's of the E415 class were first tried on the same route."

Clacton's New Passenger Station.

As a consequence of the energetic policy adopted by the L.N.E. Railway Company and that of the Urban District Council of Clacton-on-Sea, the popularity of the town as a seaside resort has increased by leaps and bounds during recent years. Only some 30 years ago the place was small, and of relative unimportance as compared with its present status, the population now numbering close upon eighteen thousand. The old railway station buildings were of small dimensions and largely of wooden construction, and although the two island

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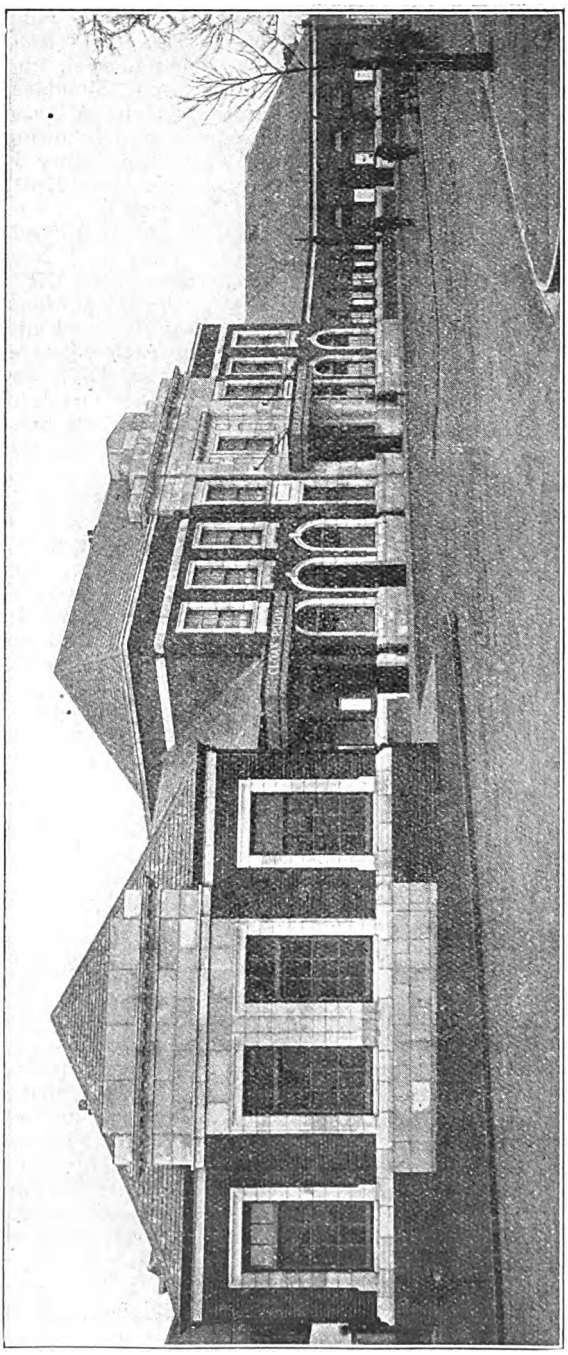
platforms were of suitable dimensions to provide for the large influx of excursion passengers, the station as a whole left a good deal to be desired. The scheme of reconstruction which was put in hand in December, 1928, and completed in November last, has, however, entirely swept away all the inadequacies of the previous arrangements, and the result is seen in a handsome, well-laid-out station, possessing all the necessary facilities for accommodating the considerable and ever-increasing volume of excursion traffic, whilst affording the regular passengers, numbering among them quite a large number of season-ticket holders travelling daily between Clacton and London and *vice versa,* a greatly-improved service. The new station at Clacton is one of the best-arranged and most handsome in appearance of any on the East Coast. The platforms and tracks have been re-aligned with a view to straightening them; central heating of the buildings has been adopted; improved and extended restaurant and other facilities provided, and everything done to add to the comfort of those using the station and at the same time facilitate the staff in the handling of traffic. Some improvements have also been effected in the layout of the yards and new locomotive terminal facilities brought into use.



GENERAL VIEW OF NEW STATION BUILDINGS, CLACTON-ON-SEA, L.N.E.R.

The Rye & Camber Light Railway.

MR. WALTER CAVAN writes from Varna, Bulgaria, as follows:—

"The picture on page 498 of your December issue of the train used on the Rye and Camber Light Railway calls to mind the fact that the complete train service, shunting, booking of tickets and so on is often performed by one man. This, I believe, is not the case during the summer season, when the traffic is considerable, but during the rest of the year, when passengers are few, a large staff is certainly not required.

"When I travelled on the line last May, the procedure was as follows:—The train is drawn up in Rye station, composed of the petrol engine and two coaches, as shown in the

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pictures. These are very old vehicles and have been in service ever since the line was opened; they have doors on one side only, and when running make a hideous noise. The petrol locomotive was built about eight or nine years ago by a firm at Ashford (I am speaking from memory), and seems to perform its light duties efficiently. The train duly leaves at its appointed hour, and travels across the Marsh to the only intermediate station, called 'Golf Course.' At this station there is one platform, with a small shelter, and crossing facilities are provided, though these are not now used. The driver-conductor-booking-clerk here takes fares and issues tickets on a punching machine, after which the train proceeds into the dunes to the terminal at Camber Sands, which likewise consists of a platform and shelter. The station is most curiously situated in the dunes, and it is somewhat hard to find it, if one does not know the lie of the land, as there is no road or even distinguishable footpath leading to it.

"In order to return to Rye, the driver uncouples by pulling a wire, which releases the central coupling, and, having run round his train and re-coupled, is ready to start on the return journey. This is accomplished in the same way as outward, the tickets being taken at 'Golf Course,' and upon arrival at Rye the locomotive is attached once again to the southward end of the train, and so the performance is done all over again.

"I should imagine that the Rye line has suffered considerably from motor-bus competition, and that its best days have passed. It could, of course, be made very attractive by converting it into a line similar to the miniature railway between Hythe, Dymchurch and Dungeness, but that is probably too risky in view of road transport. In fact, the latter is a much more comfortable way of getting to the sands, and it would seem that this little line would be soon closed during the winter months at least."

VIEW ALONG MAIN PLATFORM, CLACTON-ON-SEA, L.N.E.R.

Further Colour-Light Signalling on the Southern Railway.

THE Southern Railway equipped Charing Cross and Cannon Street with power signalling and the line thence to Borough Market Junction with colour light signals in 1926; Borough Market Junction and London Bridge station were similarly treated in 1928; then, on the opening, on July 1 last, of the new loops at Lewisham, the lines south of New Cross and east of Brockley Lane, but exclusive of those stations, to Hither Green and Ladywell were equipped. The completion of the last-named work left a gap between the east end of London Bridge station and the south end of New Cross station, in which length were the

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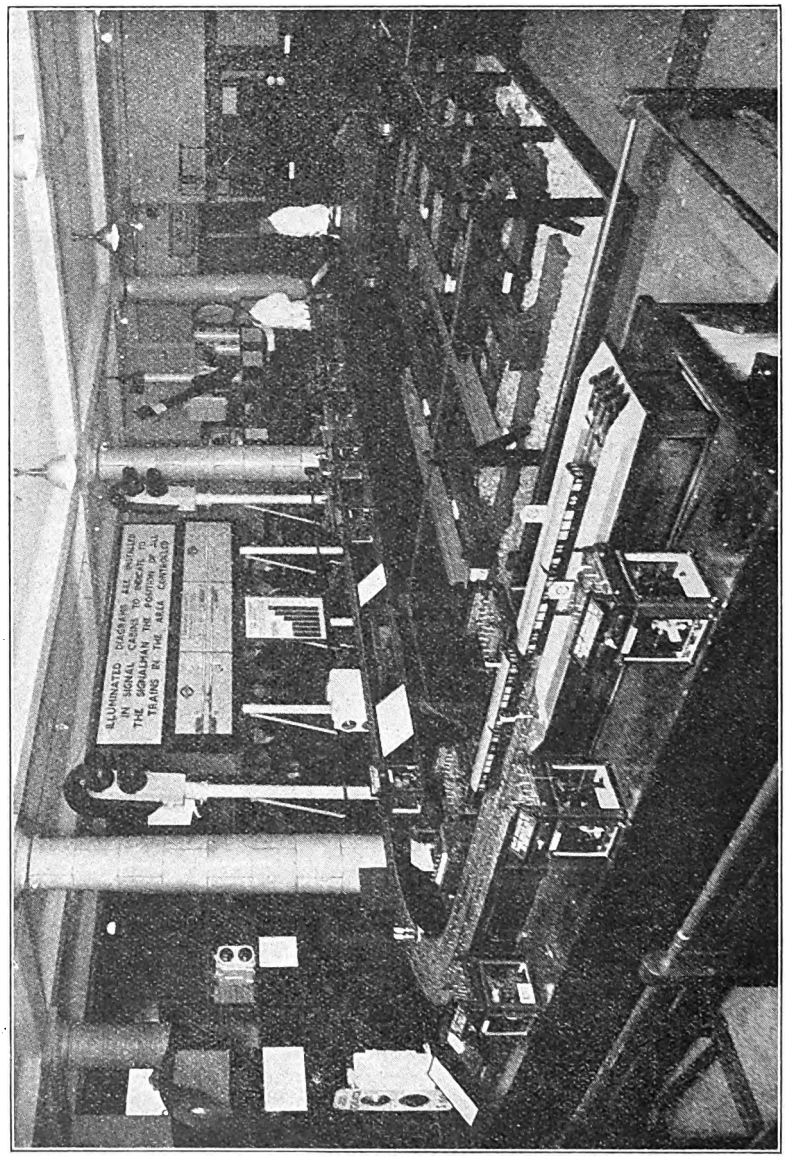

"UNDERGROUND" TRAIN WORKING AND SAFETY EXHIBIT AT CHARING CROSS. (*See page* 161.)

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signal-boxes at Spa Road, Blue Anchor, Southwark Park, Surrey Canal, North Kent East and New Cross. Those six boxes had locking frames containing 52, 22, 44, 72, 70 and 79 levers respectively.

The gap has now been filled by the provision of a new signal-box at North Kent East Junction, which has an all-electric power-operated locking frame, and automatic and controlled signals. Five signal-boxes are thus dispensed with. The new work was brought into use on Sunday, December 1.

The installation has many interesting features, especially that between London Bridge station box and St. Johns there is now only one box instead of six. The new cabin is all-electric power-worked, and contains 76 working levers ; the six dispensed with were manually operated, and contained a total of 339 levers. That economy has, in part, been achieved by the provision of automatic colour-light signals, which feature is of importance in that the whole line between Charing Cross, Cannon Street and London Bridge and Ladywell, Hither Green, Greenwich and Blackheath is now thus equipped. To signal engineers the main novelty is the fact that the new locking frame, in North Kent East Junction, has its interlocking electrically, and not, as usual, mechanically actuated. That is the first time such a thing has been done in this country, and many advantages are claimed for the new departure.

"Underground" Train Working Exhibit at Charing Cross Station.

In view of the great interest taken in previous displays staged in part of the booking hall at Charing Cross "Underground" station, a comprehensive train working exhibit was provided for public inspection. The general idea was to give the public a clear demonstration of the working of trains and of the numerous safety and other devices which have enabled "Underground" and tube railway traffic to be conducted so efficiently and safely, though, as recent events have indicated, while there may be occasional hitches, these are so rare that the average passenger generally acts upon the assumption that within an hour or two, certainly the next day, everything will be working normally.

The main feature of the exhibit was a model railway about 60 ft. in length, laid with double track, stations, automatic crossovers, and fully signalled, in conjunction with an illuminated diagram as used in busy signal-boxes. By means of time relays and other devices the rains ran continuously, signals being operated automatically as in actual practice, the relays and other appliances in connection therewith being placed alongside the track in full view, while the illuminated diagram was placed on an adjoining space above other exhibits, also in full view. Another item in the exhibit was a full-size point layout fitted with all the appliances now used in actual practice and arranged to be operated from a two-lever signal frame, while a trolley was placed upon the track so that the working of the trip cock could be demonstrated. The remainder of the exhibit included a train describer, upper-quadrant three-position signal, lower-quadrant two-position signal, various types of tunnel and daylight colour lamp signals, relays, fog repeater signals, tunnel telegraph lines with switch automatically thrown to meet emergency requirements, and with telephone for use by train staff in the case of trains stopped in tunnel, and other examples of the many notable devices whereby "Underground" traffic is operated on the scale now realised and with so wonderful a record of safety and efficiency. Several members of the "Underground" staff were continuously on duty for explaining matters and for demonstrating the various appliances, while a leaflet was prepared for general distribution.

Midland and Great Northern Joint Railway Locomotives.

Commenting upon Mr. R. G. B. Guyer's remarks in the November issue, Mr. A. W. G. Watson sends a photograph (not reproduced) of 4-4-0T No. 8, previously belonging to the M. & G.N. Joint Railway, but now employed at Ormiston Colliery, Midlothian, in the service of the Ormiston Coal Company. It still bears its M. & G.N. number, together with a plate indicating that it was built (presumably re-built) at Derby in 1908. It was, in fact, originally built by Hudswell, Clarke & Company between 1878 and 1881 for the then Eastern and Midlands Railway. It carries the original boiler, with Salter valves on the dome, as also a long cylindrical-shaped sand box in front of the water tank.

Dealing also with locomotives of the M. & G.N. Joint Railway, Mr. J. F. W. Boughton sends a detailed list of the engines in use on this system, and this is given on page 130.

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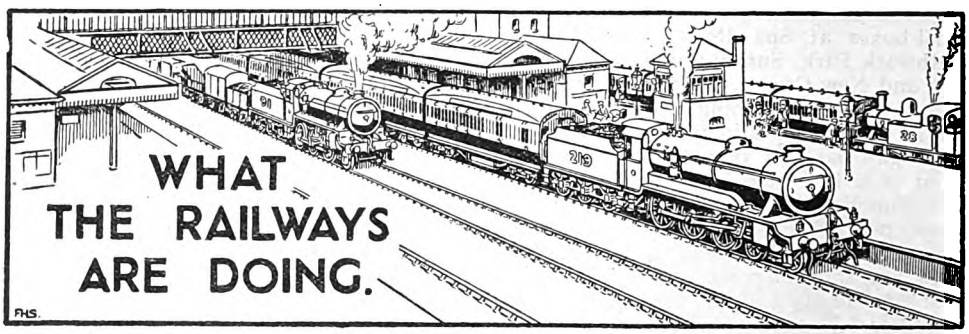

NEW L.M.S.R. APPOINTMENTS.

THE London Midland & Scottish Railway Company announces that Mr. J. H. Houldsworth has retired from the board of the company, but remains a member of the Scottish Committee.

The Right Hon. Walter Runciman, M.P., and Major Ralph Glyn, M.P., M.C., have been elected directors.

A further announcement states that:—Following the retirement of Mr. F. G. Evans, C.B.E., Vice-President, Railway Traffic Operating and Commercial Section, Mr. W. V. Wood has been appointed Vice-President, Finance and Service Departments, and Mr. J. Quirey, C.B.E., has been transferred to the post vacated by Mr. Evans.

Mr. H. V. Mosley has been appointed Chief Executive Officer for New Works and Parliamentary Business, in which capacity he will attend the Executive Committee.

Mr. Ernest Taylor has been appointed Chief Accountant in succession to Mr. J. F. Gee, retired.

The following appointments have also been authorised:—

Carriage and Wagon Department.

Mr. H. Fowler to be Assistant Works Manager (Plant), Earlestown.

Estate Department.

Mr. E. C. Dewick, District Agent, Crewe, to be District Agent, Derby.

Mr. H. Travis to be Chief Surveyor, Derby.

Mr. W. M. Groom to be District Agent, Liverpool.

Mr. H. C. Hannon to be Chief Surveyor, Liverpool.

Mr. L. S. F. Ainley to be Chief Surveyor, Manchester.

Mr. J. R. D. Mitchell to be Chief Surveyor, Leeds.

Mr. A. Allmark, District Agent, Cheltenham, to be District Agent, Crewe.

Mr. W. A. Cleworth to be Chief Surveyor, Crewe.

Mr. Inman to be Chief Surveyor, Preston.

A later statement sets forth the following further appointments:—

Mr. G. Morton to be Assistant Accountant.

Mr. E. H. Davies to be Assistant Chief Goods Manager.

MR. W. CLOWER, O.B.E.,

Chief Officer for Labour and Establishment, L.M.S.R., 1927–29, who retired on December 31.

Chief Goods Manager's Department.

The following Assistants to the Chief Goods Manager have been appointed:—

Mr. F. Findley to be Staff and Expenditure Assistant.

Mr. E. Falconer to be Outdoor Assistant.

Mr. H. W. Faircloth to be Cartage Working Assistant.

Mr. E. S. Hunt to be Station Working Assistant.

Mr. D. C. K. McCulloch to be Indoor Assistant.

Mr. W. Yeaman (late Assistant Goods Manager, Glasgow) to be Commercial Assistant.

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MR. G. L. DARBYSHIRE,
Appointed Chief Officer for Labour and Establishment, L.M.S.R., as from January 1, 1930.

MR. ERNEST TAYLOR,
Appointed Chief Accountant, L.M.S.R.

MR. W. J. PEPPER,
Appointed Assistant Passenger Manager, Southern Area, L.N.E.R.

Photo.] [*A. Corbett.*

MR. S. B. COLLETT,
Appointed Assistant Secretary, Great Western Railway.

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Mr. H. B. Webster to be Assistant for Rates and Charges.

Signal and Telegraph Engineer's Department.

Mr. V. H. Openshaw to be Indoor Assistant (Signals), Derby.

Mr. H. W. Moore to be Outdoor Assistant (Signals).

* * *

MR. G. L. DARBYSHIRE, who has been appointed to succeed Mr. W. Clower as Chief Officer for Labour and Establishment, as from January 1, commenced his career with the London & North Western Railway in the Traffic Department at Crewe in March, 1898. He was placed in charge of the staff work for the Liverpool district in 1910, and was transferred to the General Manager's Office at Euston in 1919. He was appointed as Assistant to the Chief Officer for Labour and Establishment in July, 1927.

* * *

MR. ERNEST TAYLOR, who has been appointed Chief Accountant, L.M.S.R., in succession to Mr. J. F. Gee, entered Midland Railway service on March 1, 1893, in the Accountant's Department. He served for a time more particularly in the Joint Lines section. On January 1, 1920, he was appointed Chief Clerk to the Accountant, and on the formation of the L.M.S.R. became Chief Clerk to the Accountant-General. On January 1, 1928, he was Assistant to the Controller for Costs and Statistics.

* * *

MR. W. J. PEPPER, who has been appointed Assistant Passenger Manager, Southern Area, London & North Eastern Railway, was formerly in the service of the Great Northern Railway Company, where, after a period in the Goods Department, he entered the General Manager's Office in 1898. In 1911 he was appointed Secretary of the Conciliation Boards, and later became Secretary of the Sectional Railway Councils for the Great Northern Company. On the formation of the London & North Eastern Railway in January, 1923, Mr. Pepper was appointed Principal Staff Clerk in the Chief General Manager's Office, in which position he also acted as Secretary of the Company's Side of the L.N.E.R. Sectional Railway Councils. In August, 1924, Mr. Pepper was transferred to Liverpool Street as Assistant to the Divisional General Manager (Southern Area).

* * *

MR. S. B. COLLETT, who has been appointed Assistant Secretary, Great Western Railway, was educated at Bishop's Stortford College, and was later articled to Messrs. William Mellows & Son, solicitors, of Peterborough. Early in 1915 he joined the Royal Naval Volunteer Reserve, and later in the same year was gazetted to the Durham Light Infantry. Finally he transferred to the Royal Flying Corps (now the Royal Air Force), and at the end of 1916 joined the active forces in France, where he subsequently attained the rank of Captain. Mr. Collett resigned his commission in 1921 in order to resume legal studies, and after a short period with a City firm of solicitors, qualified in that profession in March, 1922. In the same year he joined the G.W.R. service as a solicitor, in which capacity he gained valuable experience. Mr. Collett has taken an active part in the formation of the Auxiliary Air Force (the Territorials of the Air), in which force he is the senior Flight Commander.

* * *

G.W.R. GOODS DEPARTMENT APPOINTMENTS.

THE following appointments are announced, effective as from January 1, 1930:—

Mr. H. E. Cracknell, District Goods Manager, Newport, to be District Goods Manager, Cardiff, *vice* Mr. G. W. Jenkins, retired.

Mr. H. W. Payne, Chief Clerk, Chief Goods Manager's Office, to be District Goods Manager, Newport.

Mr. C. Furber, Assistant District Goods Manager, London, to be Chief Clerk to Chief Goods Manager.

Mr. J. M. Wildsmith, Chief Clerk, District Goods Manager's Office, Cardiff, to be Assistant District Goods Manager, London.

Mr. W. Powell, Assistant District Goods Manager and Chief Clerk, Exeter, to be Chief Clerk, District Goods Manager's Office, Cardiff.

* * *

THE RIGHT HON. VISCOUNT CHURCHILL, G.C.V.O., Chairman of the Great Western Railway Company, has accepted the invitation of the Board of Management of the Railway Benevolent Institution to be the President of the Institution for 1930, and Mr. J. H. Follows, C.B.E., M.V.O., Vice-President of the London Midland & Scottish Railway Company, has consented to be Chairman of the Board of Management for 1930.

* * *

SIR PERCY E. BATES, Bart., G.B.E., Deputy-Chairman of the Cunard Steam Ship Co., Ltd., has been elected to fill a vacancy on the board of the Great Western Railway Company.

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MR. A. H. TATLOW is retiring from the position of Manager of the Union of South Africa Railways Publicity Department, which he has filled with such success for many years.

* * *

MR. K. C. MARRIAN, who has been appointed Resident Engineer, Cheshire Lines Committee, was formerly Indoor Engineer's Assistant to Mr. A. P. Ross, Manager and Engineer, coming to Liverpool in 1920 from the Great Northern Railway, where he was an assistant in the District Engineer's Office, Derby. During the war he served in the Royal Engineers, and after being with a searchlight company, was transferred to the staff of the Chief Railway Construction Engineer in France.

* * *

MR. ARTHUR B. CANE, C.B.E., Secretary of the Railway Companies' Association since 1909, retired on December 31, and Mr. G. Cole Deacon, Assistant Solicitor, London Midland & Scottish Railway Company, has been appointed to succeed him. Mr. Cole Deacon will continue to act as Secretary of the Rates and Charges Committee.

* * *

MR. A. B. CANE, C.B.E., who retired on December 31 from the Secretaryship of the Railway Companies' Association, which position he occupied for over twenty years, was educated at Charterhouse and at Trinity College, Cambridge, where he obtained a first-class in the History Tripos in 1886, and in the following year won the Whewell International Law Scholarship. Mr. Cane was called to the Bar at the Inner Temple in 1890, and began work in the Chambers of the late Mr. J. P. Murphy, K.C. Afterwards he practised at the Common Law Bar, and was concerned in certain electrical inquiries, including the Marylebone arbitration in 1902, and in various schemes presented to Parliament in the succeeding three years. In March, 1909, he was appointed Secretary to the Railway Companies' Association in succession to Mr. W. Temple Franks. His tenure of this important office covered probably the most momentous period in the history of British railways, comprising, as it does, the whole period of the war, the drastic changes in the status of railway labour initiated in 1919, the Conciliation Boards, the Government control of railways and the formation of the Ministry of Transport, the Railways Act, the grouping of the railways, the revision of rates and charges, and other recent developments. In 1925 Mr. Cane acted as Joint Secretary (with Mr. H. Marriott) of the Arrangements Committee of the Tenth International Railway Congress, which was held in London in celebration of the British Railway Centenary, and which is generally conceded to have been the best organised of the whole series of railway congresses. In his early days Mr. Cane was editor of Alpe's "Law of Stamp Duties," and assisted Mr. Gore-Browne, K.C., in producing the third edition of "Concise Company Predecents." For four years he was assistant editor with Sir Frederick Pollock of "The Revised Reports."

* * *

MR. G. COLE DEACON, who has been appointed Secretary of the Railway Companies' Association, in succession to Mr. A. B. Cane, was educated at Bedford, and in 1914 was appointed an Assistant Solicitor to Mr. R. Hill Dawe, Solicitor to the Great Northern Railway Company. In 1919 he joined the Solicitor's Staff of the London & North Western Company, and shortly after amalgamation became Chief Parliamentary Assistant to Mr. Thornhill, Chief Legal Adviser of the London Midland & Scottish Railway Company. He was subsequently appointed to the position of Chief Assistant Solicitor for matters arising under the Railways Act of 1921, especially in relation to the Proceedings before the Railway Rates Tribunal and the Railway and Canal Commission Court. In 1920, Mr. Cole Deacon, in addition to his other duties, was appointed Secretary of the Special Committee of General Managers and Solicitors formed to represent the Railway Companies at the lengthy inquiry by the Rates Advisory Committee into the revision of railway charges and facilities. Since 1921, as Secretary of the Railway Rates and Charges Committee, Mr. Cole Deacon has also taken an active part in the Proceedings before the Railway Rates Tribunal in connection with the settlement of Standard Revenue and Standard Charges, &c., under the provisions of the Railways Act, 1921, and he will still retain his present appointments in addition to the Secretaryship of the Railway Companies' Association.

* * *

LORD LLOYD, High Commissioner in Egypt and the Sudan from 1925 until July last, has accepted a seat on the board of the International Sleeping Car Company (Compagnie Internationale des Wagons-Lits).

* * *

MR. G. H. LOFTUS ALLEN, Advertising and Publicity Officer, L.M.S.R., has been appointed Chairman of the British Railways Advertising and Public Relations Committee for the year 1930.

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THE fact that the London Midland & Scottish Railway has placed a contract with Beyer, Peacock & Co., Ltd., for 30 Garratt engines is not only interesting because of the value of the contract—about £300,000—but also as evidence that this type of engine, besides meeting the conditions and satisfying the requirements of railway operation in countries very different from this, is also suitable for the working of traffic on the home railways. The three engines of this class already in service have given such good results on mineral traffic working that it was almost a foregone conclusion that, in due course, Sir Henry Fowler would wish to add to their number, and this new order may be regarded as the inevitable corollary.

* * *

THE Bakerloo train, due to leave Queen's Park for Elephant and Castle at 12.15 a.m. on the morning of January 1 last, was the last of the iron gate trains to be run on the tube lines, after having completed over 1,000,000 car-miles. Experiments with cars of differing design were carried out on the Piccadilly Railway in 1920; the experience gained enabled cars required for the extensions to Edgware and Morden to be of an entirely new type. Three years ago the replacement of the whole of the original cars commenced. December 31 saw the completion of this programme: 191 new trains, composed of 1,219 individual cars, have now been put into service, at a cost of nearly £5,000,000.

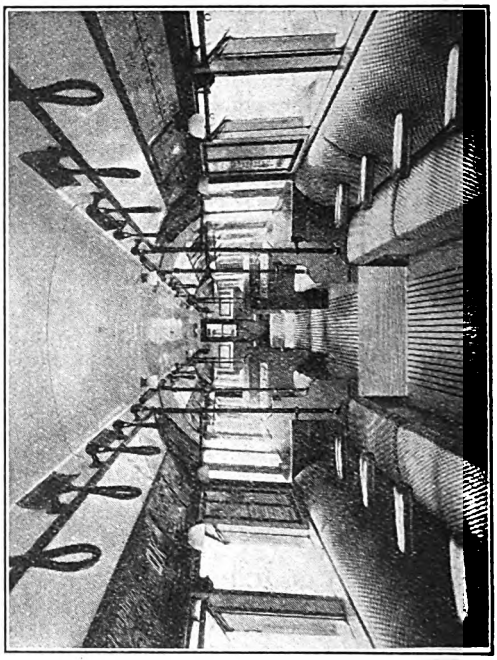
The principal features of the new type cars are the wide doors in the middle of the cars, which have eliminated the congestion which took place at the small gateways at the ends of the old cars, and thus have helped considerably to speed up operation; the improved lighting and cushioned seats, which have greatly added to the amenities of travelling; and the more powerful motors with which the new trains are equipped, and which have secured improvements in speed and smoother running.

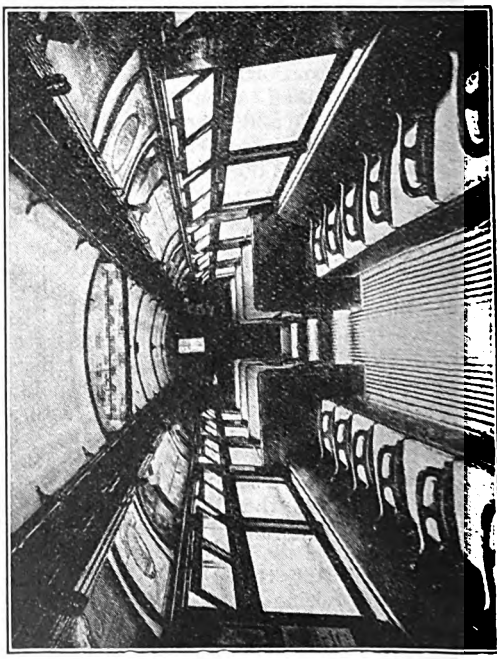
* * *

LEITH WALK station, on the North Leith branch from Edinburgh, L.N.E.R., has been closed for passenger traffic.

* * *

ESTIMATED to cost approximately £250,000, a new hotel building, constituting an extension of the well-known Midland Hotel, Manchester, has been authorised by the directors of the L.M.S.R. The new extension will be one of the most imposing buildings in Great Britain. The exterior, which will be of black-and-white design, has been specially drawn by Sir Edwin Lutyens. The architects for the building are Sir Edwin Lutyens, R.A., and Mr. M. Adam, of the company's own architectural staff. The interior of the hotel has been designed to the layout of Mr. Arthur Towle, the company's Hotels Controller.





"BAKERLOO" TUBE TRAIN INTERIORS, 1905 AND 1930.

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CAPTAIN HAROLD MACMILLAN, M.C., has been elected a director of the Great Western Railway Company to fill a vacancy on the board.

* * *

COLONEL WILLIAM JOHNSON GALLOWAY has been appointed a Director of the Cheshire Lines Committee in place of Mr. Bernard A. Firth, deceased. Mr. A. Newlands, C.B.E., M.Inst.C.E., has been appointed Engineer to the Cheshire Lines Committee, and Mr. K. C. Marrian, A.M.I.C.E., Resident Engineer, Liverpool Central station.

* * *

THE following G.W.R. men have been elected to hold office as mayors for this year: Mr. P. Boyle, Mayor of Weymouth, for the second year in succession; Mr. H. J. Rule, Mayor of Liskeard, for the second year in succession; Mr. G. H. Hunt, Mayor of Swindon; Mr. A. Davies, Mayor of Wolverhampton; Mr. J. Burgess, Mayor of Oswestry; and Mr. A. Thomas, Mayor of Lampeter.

* * *

INSPECTOR W. G. HANDS, a well-known member of the staff of the Southern Railway Advertising Department, retired on December 31, after completing 46 years' service.

* * *

MR. JAMES UNDERHILL, who died at Bristol recently, at the age of 82 years, was the driver concerned in the G.W.R. record run in 1904, when 4-2-2 No. 3065, *Duke of Connaught*, covered the 118½ miles from Bristol to Paddington, *via* Bath, at an average of 71.3 m.p.h. This followed the record run by 4-4-0 *City of Truro*, when a maximum speed of 102.3 m.p.h. was reached descending Wellington Bank.

* * *

MR. F. R. E. DAVIS, Secretary, Great Western Railway Company, has been elected a Vice-President of the Chartered Institute of Secretaries for 1930.

* * *

THE 4.55 p.m. express from Marylebone to Sheffield has been extended to Manchester (London Road), stopping only at Leicester 6.47 p.m., Nottingham 7.14 p.m., and Sheffield 8.6 p.m. The train arrives at Manchester at 9.5 p.m., thus shortening the journey time from London, Leicester, and Nottingham by 44 minutes. By this new service the total journey time from Marylebone to Manchester is 4 hours 10 minutes, or 15 minutes less than the time taken by the previous fastest L.N.E.R. express over this route. The most important trains on the Marylebone-Manchester services have been recently fitted with entirely new carriages, including all-electric kitchens and restaurant cars, which are now the L.N.E.R. standard.

* * *

THE contract for the resignalling of the Metropolitan Railway from Uxbridge to Rayners Lane has been awarded to the Westinghouse Brake & Saxby Signal Co. Ltd., of London and Chippenham. The contract includes the supply and installation of 22 main colour-light signals, fog repeater signals, 22 electric train stops, 50 condenser-fed track circuits, illuminated diagrams, A.C. relays, lever locks, apparatus cases, cable-line wire, insulations, &c.

* * *

THE Southern Railway experiment with half-price ticket "bargains" to and from seaside stations in Kent, Sussex and the Isle of Wight and London, which was commenced in October, has been so successful that it has been decided to continue the issue of these until further notice. These tickets can be obtained on Mondays, Tuesdays, Wednesdays, Thursdays and Fridays, and are available by any train leaving at or before 11 a.m., and for return by any train same day. The only exceptions are the Continental boat expresses and the 8.45 a.m. Brighton to London Bridge. The following stations have been added to the list:—Martin Mill, Sandling Junction, Sidley, Hampden Park, Canterbury (East), Canterbury (West), New Romney, Chichester, Arundel, Rye.

* * *

MR. CHARLES F. KLAPPER, of 4, Wellington Road, Bow, London, E.3, writing as Hon. Secretary of "The Omnibus Society," says:—"Although societies for the study of railway and steamship operation have existed for many years, there has hitherto been none to cater for the amateur interested in road services. The object of the Omnibus Society is to provide those interested in passenger transport by road with a medium for the interchange of information and views. The omnibus and coaching industries—and, to a less extent, tramways and trolley omnibuses—come within its scope, together with their histories, traffic operating methods, ticket arrangements, and rolling-stock. The *Omnibus Magazine* will be circulated each month to the members of the Society to provide a news service, and also an opportunity of discussing matters of interest." The entrance fee is 2s. 6d.; annual subscription, 5s.

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THE annual Carol Concert at Queen's Hall of the L.N.E.R. Musical Society on December 14 proved as popular as ever. The choir of 300 male voices, gathered from the various sections in London, Cambridge, Doncaster, Ipswich, Lincoln, Norwich, Peterborough, York, &c., was reinforced on this occasion by a choir of boys from the Alexandra Orphanage and Christ Church, Wanstead. The conductors were Mr. Edgar R. Wilby and Mr. Maddern Williams, F.R.C.O., while the soloist was Miss Mavis Bennett. Mr. Sydney Harrington, F.R.C.O., was hon. organist and accompanist. From 7.45 p.m. Mr. Leslie Woodgate gave an organ recital. There was a large attendance of directors and officers of the London & North Eastern Railway, with representatives from other systems, and among those present may be noted Mr. William Whitelaw, Chairman, and the Rt. Hon. Lord Faringdon, C.H., Deputy Chairman, L.N.E.R.; the Most Hon. the Marquess of Londonderry, K.G., P.C., M.V.O., Mr. W. K. Whigham and Mr. Ronald W. Matthews, Directors ; Sir Ralph Wedgwood, C.B., C.M.G., Chief General Manager, L.N.E.R.; and many officers.

* * *

ON Thursday, December 12, Mr. J. B. Elliot, Assistant to General Manager (Public Relations and Advertising), Southern Railway, gave an address to the Railway Students Association of the London School of Economics on "Selling Railway Transport—Some New Problems."

* * *

EMPLOYEES in the Locomotive, Carriage and Wagon sheds and the Repairing shops of the Somerset & Dorset Joint Railway at Highbridge numbered from 200 to 300 men, and the majority will be transferred to the works of one of the parent companies, the L.M.S. and the S.R. In future the L.M.S. will supply and maintain the locomotives. The civil engineering shops at Glastonbury are also officially closed, and the work undertaken there—permanent way, buildings, &c.—will be undertaken in future by the Southern Railway Company. The men employed at Glastonbury will also be transferred. The S. and D.J.R. continues to remain a separate unit under the joint ownership of the two parent companies, and accounts will, as hitherto, be kept distinct. Otherwise there will be no changes in connection with the line. The offices of Mr. G. H. Wheeler, M.B.E. (the Traffic Superintendent), will remain at Bath.

* * *

OWING to pressure of other business, Mr. D. S. Barrie has resigned from the position of Honarary London Secretary of the Railway Correspondence and Travel Society, in which capacity he has acted for the past two years. Mr. Barrie has been succeeded as London representative of the Society by Mr. F. M. Butterfield, 78, Boundary Road, N.W.

* * *

THE photograph reproduced on page 67 of the January number, showing the "North Star" express at Bruxelles (Midi), was taken by Mr. H. M. Pearson, and not by Mr. H. Baud as stated.

* * *

MR. DUNCAN B. MCKENZIE points out that the inscription to the middle illustration on page 28 of the January number should read: 4-4-2 No. 9870, and not as stated.

* * *

NEW L.M.S.R. 0-8-0 standard freight engines recently turned out at Crewe bear Nos. 9584-99, these being the last of the present order. The first of the series, No. 9500, left the works on March 30 last, the remainder following on in quick succession. By December 31 the 100th was completed and ready for service—all within nine months, which is a record. Further allocation of this type include Nos. 9575-84, all of which are attached to the L.N.W. section. The first five of an order for 2-6-0 mixed traffic engines are now in hand at Crewe, Nos. 13150-4. Following delivery towards the end of December last, the new 4-6-0 high pressure "Scot" class locomotive, No. 6399 *Fury*, is at present undergoing trials, preparatory to being placed into regular service. Engines adapted for working over the Midland division include "Prince of Wales" class Nos. 5649, 5748, 5773, 5837 ; "George the Fifth" class Nos. 5211, 5360 ; 19-in. goods class Nos. 8737, 8762, 8868. The following engines have been altered from steam to vacuum brake:—19-in. goods class Nos. 8731, 8748, 8834 ; "G" class No. 9150 ; "G1" class No. 9607. Two further 4-6-4 tank engines of L.T.S. design have recently been broken up at Crewe, Nos. 2193-4 (late Nos. 2101-2) ; also the following: 0-4-2 shunters Nos. 7852, 7857, 7868 ; "Renown" class Nos. 5113, 5133, 5170 ; 2-8-0 M.M. class Nos. 9659, 9665 ; Special Tank shunters Nos. 7409, 7454. At the end of 1929 there were 35 2-4-0 "Jumbos" still at work, excluding those engaged on departmental work, *e g.*, "Engineer, Lancaster," &c. The one remaining ex N.S.R. 4-4-0 locomotive is No. 5413, not 5411, as stated on page 418 of the November issue.

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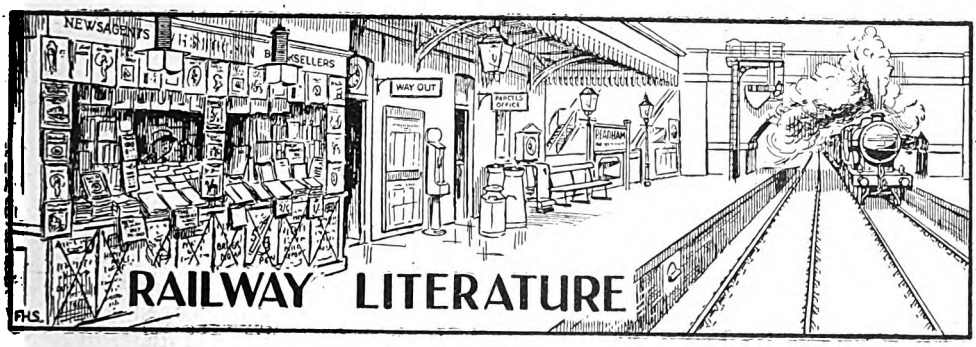

RAILWAY LITERATURE

RAILWAY AND SEAPORT FREIGHT MOVEMENT. With Examples of British and American Practice. By George Bulkeley, A.M.I.Mech.E. London: Crosby Lockwood & Son, Stationers' Hall Court, Ludgate Hill, E.C.4. Price 28s. net.

Mr. Bulkeley is to be congratulated on having produced an unusual book of a practically helpful character. The publishers state on the cover that it is believed this is the first time that railway and seaport practice have been dealt with as an interdependent whole and combined in one volume. This is probably the case. Mr. Ross Johnson has written a practical little manual on "Modern Dock Operation," which gives due place to dock railways as such, and one or two of Dr. Brysson Cunningham's works touch on the same subject; but we certainly know of no work which considers freight movement both by rail and at seaports as a unified operation and gives equal and balanced attention to land and water carriage as an interdependent whole.

The author's method of treatment is best illustrated by a survey of his chapter headings: The applied science of freight movement; types of freight rolling-stock and their distribution; types of ocean and lake freight shipping; railway freight motive power and train resistance; control of railway movement by signalling; movement of freight trains; movement through railway yards and seaport layouts; movement through railway sheds and seaport transit sheds; movement of freight between ship and shore; statistics of freight movement. It will thus be seen how the subject is interlocked, the unifying principle being to follow the actual movement of freight from its place of origin to the ship's hold.

Mr. Bulkeley, whom doubtless many of our readers remember as an officer of the Great Western Railway, is now Port Manager of the Kenya & Uganda Railways and Harbours. His book, while of value for reference to railway and port managers and superintendents, is specially addressed to young men, and is intended to serve as a text book to junior railway and seaport officers, and students of transport. Its writing was encouraged by a remarkable man, the late Sir Christian Felling, General Manager of the Kenya & Uganda Railways; and it is graced by an admirable introduction by Sir Edward Grigg, the Governor of Kenya, in which he pays tribute to the part which railways have played in the making of East Africa. Sir Edward Grigg's words should be conned by all young men who are starting in transport as a career, and so also should Mr. Bulkeley's last chapter, "Getting Things Done," which sums up the wisdom of practical experience in the art of transport (and human) management.

The book is profusely illustrated with photographs, diagrams and plates, and contains numerous useful tables and other data. Examples are quoted from both recent British and American practice.

RAILWAY CONTROL BY RAILWAY STOCKHOLDERS (NOT BY RAILWAY DIRECTORS).—By G. A. Nnokes. 1929: The Bordyke Press, Burgess Hill, Sussex. Price 1s. net.

The general purpose of this pamphlet is indicated by its title. Substitute control by stockholders for control by directors, and the ills from which British railways are suffering will disappear, or, at all events, be largely mitigated. As the author states quite correctly, the action of Parliament in passing the Railway Companies (Accounts and Returns) Act, 1911, and the Railways Act, 1921, has had the effect of greatly reducing the number of opportunities previously enjoyed by stockholders of speaking at railway meetings. This, he maintains, has enormously increased the directors' power of control and encouraged them in lavish and unnecessary expenditure. At the same time, he overstates his case by including in the extravagances of which he complains many which were committed while the stockholders still had their right of protest twice a year. On pages 10 to 27

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of the pamphlet are detailed criticisms—largely irrelevant—of commissions and omissions in the present practice of the four principal companies, while some relate to matters which took place a generation ago or more.

The remedy proposed is a statutory supervisory committee of stockholders, to be elected by all stockholders in all British railways, the committee to have offices and a small staff, and to have a right of veto on capital expenditure exceeding £50,000 on any one item or revenue expenditure exceeding £20,000, the whole body of stockholders having the final word in such matters. Each board of directors should be reduced to 12 or 15, their remuneration increasing by £1,000 a year with each 1 per cent. dividend on ordinary or deferred stock paid above a fixed percentage.

We confess to being not the least enamoured of this plan. It would lead to too much divided authority, and from our considerable experience of railway meetings we do not anticipate any improvement that would result from its adoption. In spite of the very considerable latitude allowed to speakers at railway meetings, we are unable to call to mind any really fruitful suggestions put forward by stockholders from the body of the hall on these occasions. The author needs to be reminded that directors are themselves stockholders and probably represent the great body of proprietors who do not attend the meetings at least as fully as do those who are present.

BRITISH LOCOMOTIVES: THEIR EVOLUTION AND DEVELOPMENT. By C. Gibbard Jackson. London: Sampson Low, Marston & Company, Limited. Price 6s. net.

This latest volume of Mr. Gibbard Jackson is of interest, in that it deals systematically with locomotive development on the individual sections of each of the four group railways. Following a preliminary chapter, which gives a brief survey of early locomotive development, eight chapters are devoted to the locomotives of the London Midland and Scottish Railway, two dealing with the London and North Western section (1846-1882 and 1882-1922), two with the Midland (1844-1881 and 1881-1922), one with the Lancashire and Yorkshire Railway, one with the Caledonian, and one with the Glasgow and South Western and Highland lines, with a concluding chapter dealing with L.M.S. locomotives since amalgamation. Eight chapters are similarly devoted to sections of the L.N.E.R. and to post-grouping practice, while two dealing with the Great Western Railway, and four with the Southern, complete an interesting book. There is a generous assortment of illustrations, covering practically all engine classes of particular interest, while the frontispiece is a colour view of L.N.E.R. No. 4472 *Flying Scotsman*. The book does not, of course, purport to give a great deal of technical detail, and leading dimensions only are given. There is, however, a great deal of interesting comment, and we have no doubt that most of our readers will wish to add this volume to their libraries. The wrapper bears a view of the *Royal Scot* express, L.M.S.R., with a head-on view of No. 6100.

GREAT WESTERN PORTS, 1930. Produced and published by H. N. Appleby, by arrangement with the Great Western Railway Company.

Latest statistics at the time of going to press with this exceedingly useful and well-compiled publication show an all-round improvement in the traffic of the company's docks as compared with 1928. While the principal feature has been the steady improvement of the coal shipping business, as compared with 1928, there are, we learn, one or two features on the general cargo side which show that the improvement in the coal trade is reflecting itself in other directions—such as increased iron ore imports into the South Wales ports, and a substantial improvement in the shipments of tinplates and cement from the local works. A notable feature of the trade is the volume and variety of general goods imported at or exported from the company's docks. Information relating to these and other interesting items will be found in the handbook now under review, which, needless to say, bears the same evidence of care in its compilation as its predecessor and is as excellently produced, the half-tone illustrations which embellish its pages being, as before, specially meritorious. The different docks are sectionised, each section being prefaced with a fine folding plan, in colours, of the particular area dealt with. The frontispiece contains three admirable portraits of Viscount Churchill, Chairman; Mr. James Milne, General Manager; and Mr. Charles S. Page, Chief Docks Manager.

THE "UNDERGROUND" GROUP, 55, BROADWAY, WESTMINSTER, S.W.—Very appropriately, the "Underground's" calendar for 1930 commemorates, in a most interesting way, the centenary of the London Omnibus, 1829-1929. It takes the form of a book, substantially bound in green and gold, and gives—chiefly by means of

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pictures—a wonderfully clear idea of the origin and development of the omnibus, the frontispiece being a portrait of M. Blaise Pascal, pioneer of the omnibus, 1662. The part played by the vehicle in London's daily traffic is very cleverly shown, and some of the pictures of the past will serve to revive many pleasant memories. The pictures reproduced from *Punch* are a particularly happy feature—and especially so the skits on the advent of the motor-bus. The front end of the calendar shows a new topographical map of the country in the vicinity of London, whilst the back end shows the same area from Stanford's 2-in. map of London and its environs. Most of the pictures are merely captioned, but here and there one lights upon a descriptive tabloid, which is both instructive and entertaining. Throughout the book are interspersed seven-day diary calendars, with morning, afternoon and evening spaces for noting appointments.

Mr. Percy E. Morris, of 25, Wingate Road, Hammersmith, London, W.6, sends a copy of "A Skipper of Inland Ways," described as a song of the engine-driver and written by "railwaymen for railwaymen," and claimed to be "the only real community song for railwaymen ever written." The words are by Mr. Percy Morris, and the music by Mr. Arthur Richardson. Copies (price 2s.) can be obtained from Walsh, Holmes & Co., Ltd., 148, Charing Cross Road, W.C.2. Arrangements have been made by which railway employees can obtain copies at the reduced price of 1s., post free, from Mr. Percy E. Morris, 25, Wingate Road, Hammersmith, W.6, or Mr. Arthur Richardson, 225, Queen's Park Road, Brighton, Sussex. Both gentlemen are employees of the Southern Railway. A special point is that the profits from copies sold are devoted to the funds of the Southern Railway Orphanages. On the cover is a portrait of the Right Hon. J. H. Thomas, P.C., M.P., between impressionist sketches of railway engines. The subject of the song is, of course, the engine-driver, and, as it goes with a good swing and there is an effective chorus without any special musical difficulties, we anticipate that this song will realise considerable favour.

The Liverpool Office of The American Express Company send a copy of the New York Central Lines Calendar for 1930. This is of the wall type, with a large reproduction in colour showing a night view of the eastward and westward "Twentieth Century" expresses on opposite sides of the same platform at Buffalo Central terminal. One train is, of course, shown in head-on view from the front, the engine standing up very vividly, while the view of the other train is from the rear end. The illustration is completed by part of the station premises, including the flood-lighted tower, the effect against the blue night sky, in conjunction with engine and train lights and platform and station illumination, being very effective. The picture is based on a painting by Mr. Walter N. Greene. It is explained that the picture is made practicable owing to the fact that eastward and westward "Twentieth Century" expresses are due at Buffalo just about midnight. The calendar is of the type in which three months are shown at a time, so that each display includes the month before and the month after that primarily shown.

Centenary History of the Liverpool & Manchester Railway. By C. F. Dendy Marshall, M.A. The Locomotive Publishing Co., Ltd., 3, Amen Corner, E.C.4. 192 pp. and plates. Price 30s.

We briefly record here the receipt of a copy of the above history of what the author claims to be "the first railway, as we understand the term, in the world," a claim which he explains in the Preface. It need only be said at the moment that the history is in every way worthy of the momentous event which it records, equally in the evidence of wide and scholarly research which it affords, and the masterly manner in which the materials have been utilised, as in the handsome style in which the work has been produced, reflecting great credit alike upon author, printers, and publishers. It is magnificently illustrated with plates in colours and photogravure. We hope to give it an adequate review at an early date.

Door to Door by G.W.R. Country Cartage Services.—A new edition of the G.W.R. Country Lorry booklet has been issued, revised as necessary in view of the many recent developments in this branch of the company's activities. It includes an index of stations at which lorry services are in operation, scales of charges for 2- and 4-ton loads, and the stations to which they apply, and charges for small consignments up to and including 1 ton. Mr. James Milne, General Manager, contributes a foreword describing the arrangements made by the G.W.R., while several illustrations show this class of traffic in process of handling. There is also a folding map of the system.

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BULLETIN No. 20 of THE RAILWAY AND LOCOMOTIVE HISTORICAL SOCIETY contains articles on the Rainhill Train in 1829, the "Stourbridge Lion" Centenary, Early Tramroads in Great Britain, Early English Engines that came to America, an Atlantic City High-Speed train, Pioneer Locomotives on the Pacific Coast, Eastwich and Harrison's "Mercury," and other items. Altogether an interesting issue.

L.N.E.R. HIGH-PRESSURE COMPOUND EXPRESS LOCOMOTIVE No. 10000. A set of four "real photo." postcards illustrating this remarkable locomotive is now on sale at L.N.E.R. offices and principal stations, as well as at bookstalls, the price being 8d. for the set of four. A photogravure plate of the engine has also been issued. Copies of this are being sold at 1s. In view of the special interest attaching to this exceptional engine, we anticipate a large demand for both postcards and photograph.

HENSCHEL & SON, of Cassel, Germany, send a calendar for 1930 of the block type, mounted upon a card bearing a striking view in colour of one of their steel works, with indications of the handling of heavy forgings and pressed and stamped work. Incidentally, the daily calendar leaves are worded in English, and bear on the back selections from English literature.

MESSRS. W. & G. FOYLE, LIMITED, 119-125, Charing Cross Road, London, W.C.2, send a copy of their new catalogue of books of technical and applied science. This firm has a very wide selection of both standard and special out of print or other rare books. They are also prepared to undertake the obtaining of scarce books.

AUSTRIA FOR WINTER SPORTS.—The Austrian Federal Railways, 25, Cockspur Street, S.W.1, send us a copy of a neat little booklet dealing with Austria as the country *par excellence* for winter sports. It is very readably written, and is suitably illustrated.

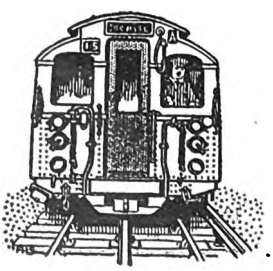
MESSRS. WILLIAMS, LEA & COMPANY, LIMITED, of Clifton House, Worship Street, London, E.C.2, sends a useful calendar for 1930. At the head a sketch map emphasises that this firm specialises in printing for all countries and in all languages.

MR. RICHARD TILLING, of 106, Great Dover Street, London, S.E.1, sends a desk pad calendar and diary for 1930. This is of the type having one leaf for each day, ruled for the entry of engagements throughout the working hours of the day. Mr. Tilling also sends a wall calendar for 1930.

MR. C. F. KLAPPER (The Business Company, 100, Victoria Street, S.W.1; works, 4, Wellington Road, Bow, London, E.3) sends a calendar for 1930, prepared by the mimeograph process, of which Mr. E. J. Klapper has made a speciality.

THE Wimbledon and District Model Railway Club send a calendar for 1930, the illustration being a mimeographed sketch of Kent and East Sussex 2-4-0 tank engine *Tenterden*.

THE WELIN-HIGGINS COMPANY, LIMITED, of Grosvenor Road, Coventry, send a pocket diary and calendar bound in crimson "Fabrikoid" leather cloth.



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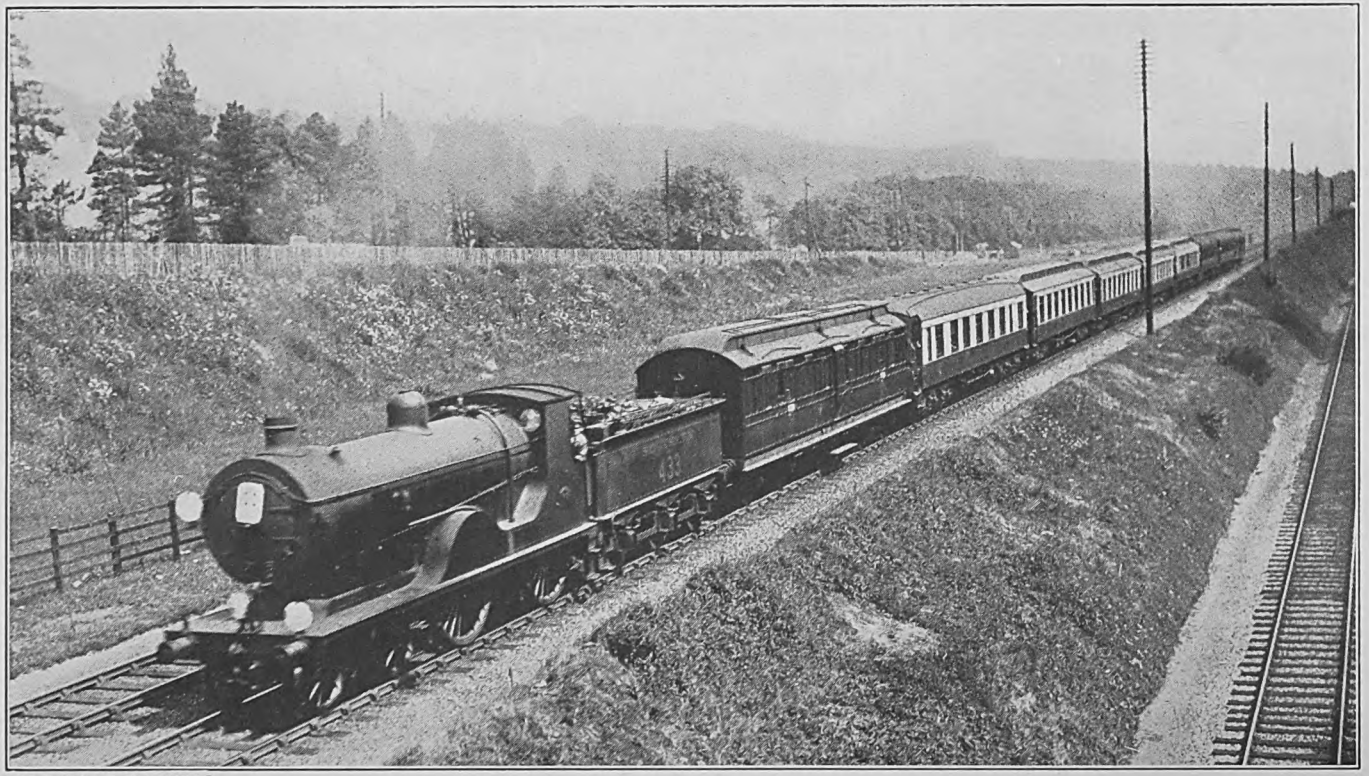

THE RAILWAY MAGAZINE.]

DOWN EASTBOURNE PULLMAN LIMITED EXPRESS, SOUTHERN RAILWAY.

4-4-0 No. E433. View taken near Quarry Tunnel.

From a photograph by R. W. Airy.

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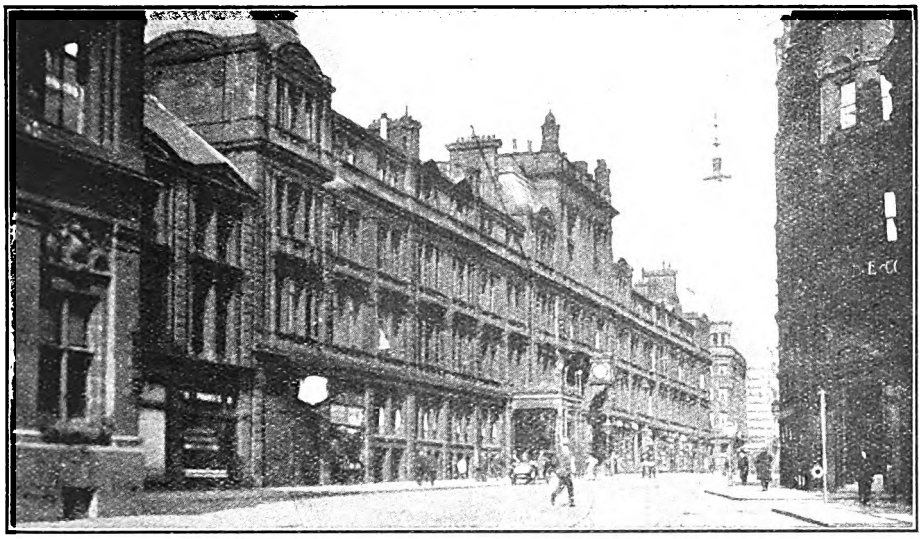

Notable Railway Stations and their Traffic.

LIVERPOOL (EXCHANGE), LONDON MIDLAND AND SCOTTISH RAILWAY.

By J. F. GAIRNS, M.Inst.T., M.I.Loco.E.

IT is somewhat remarkable that, although ranking beyond question as one of the notable railway stations of the British Isles, the Liverpool Station of the late Lancashire and Yorkshire Railway known as "Exchange" should not have received attention hitherto in our "Notable Railway Station" series of articles, though incidental reference has, of course, been made to it on a number of occasions. It is, however, one of the three chief stations in Liverpool, and upon it centres a considerable volume of main-line traffic associated particularly with what is now the Lancashire and Yorkshire section of the London Midland and Scottish Railway, though it has relations with traffic on the London and North Western and Midland sections and to and from Scotland. It is, further, an important centre for suburban traffic on a large scale which is, moreover, operated electrically for the most part and has been, so far as the Southport route is concerned, for more than 25 years past. The station has associated with it a large and modern hotel. It has ten platforms, receiving over 100 steam and 250 electric trains daily, departures representing about the same numbers, and it is used by some 70,000 passengers daily, with tremendously increased numbers of trains and passengers at busy periods, such as Bank Holidays, Lancashire Town Holidays, Aintree Races, etc.

The station is located well towards the central portion of Liverpool, its main frontage being upon Tithe Barn Street, closely parallel to Water Street and Dale Street, while adjacent, on Old Hall Street, is the Exchange from which it takes its name. The station is about three-quarters of a mile from Lime Street and Central Stations, but is not far from the Mersey Railway St. James Street Station and is quite handy for the Merseyside Docks.

Just beyond station limits is the Great Howard Street Goods Station of the London Midland and Scottish Railway, whose tracks connect with the main line barely a mile from Exchange. In the vicinity of Sandhills, the first station, connections are made with dock-serving lines, and

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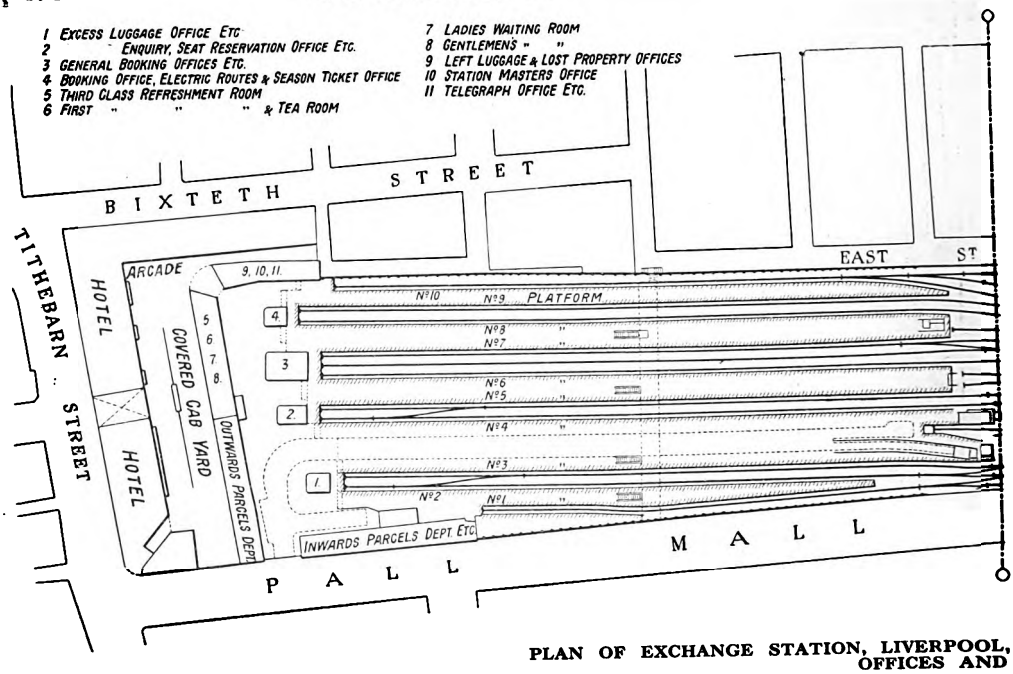

PLAN OF EXCHANGE STATION, LIVERPOOL, OFFICES AND

the station is a junction constituting the first divergence in which passenger trains are concerned. The main line continues through Kirkdale to Walton Junction, one section proceeding eastwards towards Wigan, Bolton and Manchester, and the other proceeding north-easterly through Aintree and Ormskirk towards Preston. The branch route from Sandhills proceeds through Bootle, and in the neighbourhood of Seaforth and Litherland divides to constitute the main route to Southport and the route *via* Linacre Road to Aintree and the Preston line, or across to the Wigan and Manchester line at Fazakerley.

The principal train services thus concerned are, therefore,

Electric.

(*a*) Exchange to Southport and to Aintree *via* Linacre Road, and

(*b*) Exchange to Aintree *via* Kirkdale and to Ormskirk.

Steam.

(*a*) Manchester and beyond *via* the direct route, avoiding Wigan and continuing *via* Atherton to Manchester.

(*b*) Liverpool *via* Wigan and Bolton to Manchester *via* Clifton Junction, or continuing across to Bury and Rochdale direct, in some instances with through carriages or through portions for destinations beyond, and

(*c*) Exchange to Preston or to Blackburn, Accrington, Colne and beyond.

In addition, there are certain local steam services and trains which do not come in any of the categories indicated, in view of the fact that, further afield, the old Lancashire and Yorkshire system involved a network of interconnecting lines allowing for a wide variety of trains, organised either regularly or to meet special requirements. In the main, as will be seen later, the train services thus involved are not very different from those which applied prior to grouping, in that, for the majority of the journeys concerned, it is still most convenient for trains to be operated on the basis of the methods in vogue in Lancashire and Yorkshire days, though there have been a few developments under the London Midland and Scottish Railway.

Dealing first with the interior of the station itself, it will be best to commence with No. 1 platform, on the Pall Mall side of the station, and work across to No. 10, adjacent to Old Hall Street. Although No. 1 platform line is for part of its length against the boundary wall, it is bent inwards to some extent near the buffer stops so as to provide an angular platform space between it and the boundary wall associated with the Inwards Parcels Department. Behind the buffer stops there is an office, while adja-

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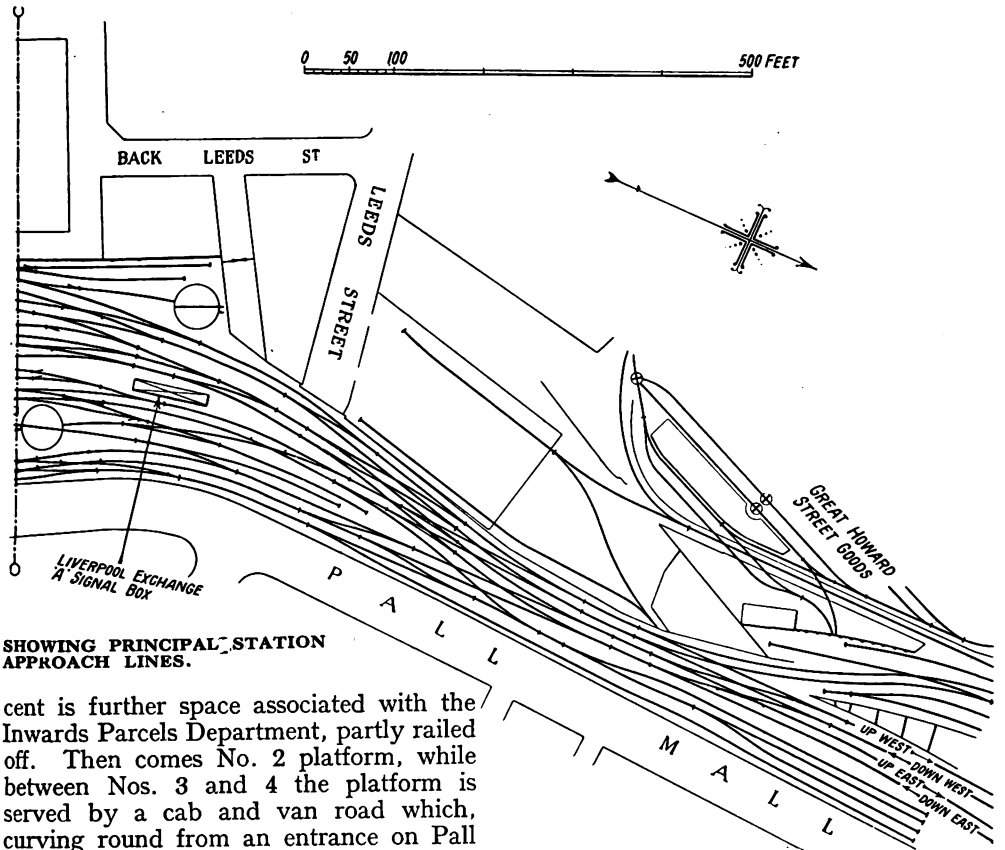

SHOWING PRINCIPAL STATION APPROACH LINES.

cent is further space associated with the Inwards Parcels Department, partly railed off. Then comes No. 2 platform, while between Nos. 3 and 4 the platform is served by a cab and van road which, curving round from an entrance on Pall Mall, provides not only for vehicles attending on trains, but also for vans serving the Inwards Parcels Department and the Outwards Parcels Department, which is included in the main range of buildings on the other side of the circulating space. The remaining platforms are bounded, respectively, by platform lines Nos. 5 and 6, 7 and 8, and 9 and 10, the last-mentioned being against the boundary wall on the Old Hall Street side of the station. The respective pairs of platform lines are arranged somewhat in echelon fashion, in that the buffer stops of Nos. 2 and 3 are nearer the main block of buildings than No. 1, and Nos. 4 and 5 nearer than Nos. 2 and 3, and so on, though this does not apply beyond No. 9 in that No. 10 is rather shorter in view of the fact that behind its buffer stops is a further range of station buildings. Immediately behind the respective pairs of buffer stops are a number of small staff offices used by ticket collectors, inspectors, etc., or if the spaces are not thus required, advertising kiosks are placed in these positions. Separated from these erections are several small building blocks. That behind Nos. 2 and 3 includes the Excess Luggage Office; that behind Nos. 4 and 5, Public Enquiry and Seat Reservation Offices; that behind Nos. 6 and 7, a General Booking Office, with six classified windows and an excursion window; and that behind Nos. 8 and 9, a Booking Office for the electric routes, and behind it a Season Ticket Office. Certain of these building blocks have lavatories behind the offices.

Beyond these small blocks is the main circulating area, on the other side of which is a range of office buildings, constituting the station level of the hotel block. Commencing at the Pall Mall carriage road entrance, these premises are: Outwards Parcels Department, with the offices beyond and the hotel stores above; openings leading to the outside cab road, to be referred to later; Third Class Refreshment Room; First Class Refreshment Room and Tea Room; First and Third Class Ladies' Waiting Rooms; and Gentlemen's First Class Waiting

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MAIN ENTRANCE, THROUGH HOTEL GATEWAY.

Room. Along this range of buildings may be noted, at various positions, a large clock, bookstall, train indicator, and various stalls and kiosks. At the corner, beyond the range of buildings in question, is an archway (with clock above) arranged at an angle, in that it gives access to an arcade of shops leading to the outside of the station.

In line with No. 10 platform the buildings include Left Luggage and Lost Property Offices, Station Master's Office, Telegraph Office, etc. From the archway mentioned, access is given to a stairway serving offices placed above the station buildings.

Behind the series of premises mentioned, and between them and the main hotel block, is a covered cab road, which allows of cabs bringing arriving passengers depositing them at positions adjacent to the archway previously mentioned as leading to the main circulating area. This cab road is divided midway to separate arriving and departing vehicles. Beyond the turn of the cab road there is a space leading to the arcade previously referred to, which is also reached from the archway in the corner of the main circulating area. This arcade has along it a number of shops of various kinds. It continues under the hotel block to give access to Tithe Barn Street. There is also a stairway leading down to Old Hall Street. Although there is a Tea Room, in addition to First and Third Class Refreshment Rooms, in the main block of station buildings, a Dining and Grill Room is provided in the hotel block beyond the cab road last described. The whole of the premises are, of course, roofed over, including the cab road between the hotel and station blocks of buildings, the main circulating area, and the shop arcade. Over the platforms there are longitudinal gable sections partially glazed, the intermediate supporting pillars being along the platforms serving Nos. 3 and 4, 5 and 6, and 7 and 8 platform lines. Over No. 1 platform, however, the roof consists of a series of short transverse gables. Here and there about the station are telephone boxes, postal facilities, automatic machines, &c. All platform lines are fitted with hydraulic buffer stops. For the main part, station buildings are tiled in yellow, with dark-green bases and dados. The small buildings behind the respective sets of buffer stops are mostly faced with wood, but include some neat cabinet work and effective use of dark and light brown tints.

All platforms are now barriered off and fitted with the familiar Lancashire and Yorkshire type of ticket-collecting barriers, which may be roughly described as series of square "S" frames, so that collectors can occupy the space enclosed by each section and thus have full control of passengers passing on either side or both sides. There are, of course, two or more sets of these in most cases, the sections not in use being enclosed by hinged flaps for the time being. Some of the collecting positions have been fitted with glass wind-screens. As necessary, there are also gates for the passage of luggage-barrows, etc. A subway is provided to connect the outer ends of platforms Nos. 1—2, 3—4, 5—6 and 7—8, but does not serve Nos. 9—10. This subway, although not very much used in the ordi-

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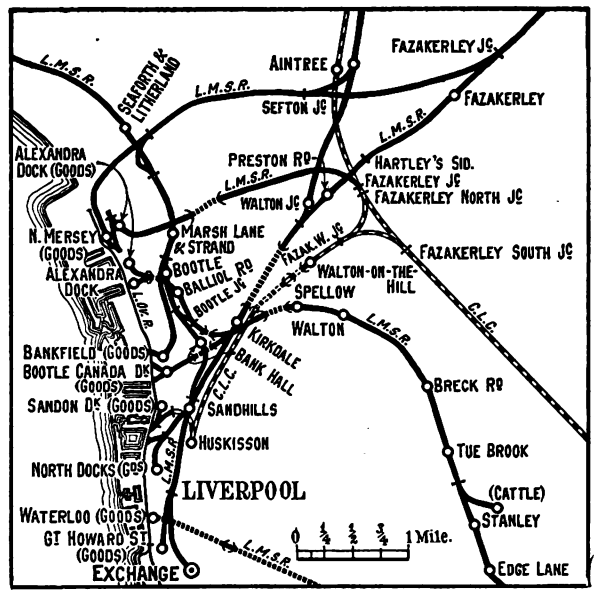
nary way, is useful at times when very heavy special traffic is being operated to Aintree, in that it is sometimes utilised to pass first-class passengers from No. 2 platform to the outer ends of Nos. 5 and 6 or 7 and 8, while third-class passengers are accommodated in the rear portions of trains and admitted directly through the respective platform barriers.

The general train indicator on the circulating area, which is of the Benn & Cronin type, is, of course, designed to give full particulars of trains for various destinations and does not provide for indicating the platforms from which trains for various places will next depart. Information of this kind is given by train indicators on the respective platforms, a short way beyond the platform barriers, so that they can be seen by passengers on the circulating area as well as on the platform. The indicators for Nos. 1, 2, 3, 4, 5 and 6 platforms are of an old type, giving train time and principal stations served. Those on Nos. 7, 8, 9 and 10, however, are of a new electric pattern.

These show first and second train to be dealt with at each platform, with the stations served. All indicators, whether of the electric or the old type, show both ways, so that their indications can be seen by passengers on the respective platforms as well as those on the circulating area. Platforms Nos. 7, 8, 9 and 10 are principally used by electric trains, and it is for that reason that the electric indicators have so far been provided only for these platforms.

There are four signal cabins under the oversight of the Station Master at Exchange Station: "A" cabin (161 levers) and "B" cabin (135 levers and 27 spare) serving the station itself, with Exchange Station (56 levers and 10 spare) and Great Howard Street Goods (30 levers and 3 spare). Signalling is entirely mechanical, with lock and block, and indicators and other improvements introduced during recent years, but does not include any special features, in that it is based upon the standard methods in force on the Lancashire and Yorkshire Railway at the time the signalling was last equipped.



SKETCH MAP SHOWING RAILWAY ROUTES.

The Station Master, Mr. Abram, is assisted by 2 Chief Inspectors, Messrs. T. Blanchard and G. Caine. There are 4 other Station Inspectors and 3 Yard Inspectors. The total staff attached to the station numbers 280. The booking offices are under the charge of Mr. W. Hayes, while parcels traffic is under the direction of a foreman responsible to the London Midland and Scottish Railway Agent for Liverpool, who is, however, himself stationed at Lime Street Station.

Mr. Abram entered Lancashire and Yorkshire Railway service in 1887 as a clerk, dealing with both goods and passenger work at Burscough Bridge. He was later employed similarly at Gathurst, Parbold and Aintree, and in the Goods Department at Preston, Burscough Junction and Blackpool. He was appointed Station Master at Hesketh Bank in 1898, and in 1899 was transferred to Manchester (Victoria) as relief clerk. In 1908 he was appointed Station Master and Goods Agent at Marsh Lane (Bootle), but in 1913 went to Preston as Station Master in charge of the East Lancashire section of the station. In 1917 he went to

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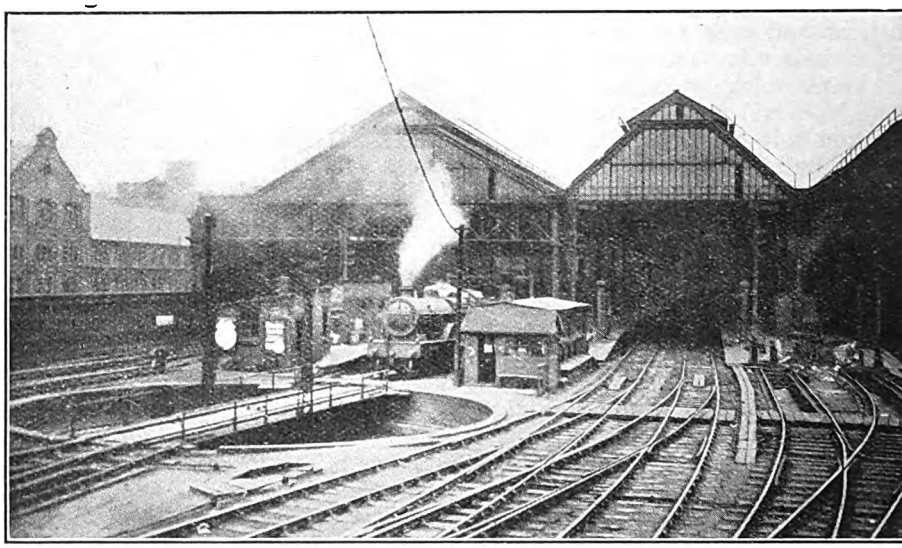
Accrington as Station Master, transferring to Blackburn in January, 1921. Two months later he came to Liverpool (Exchange).

Although there are important expresses on other routes, principal interest attaches to those in the Manchester direction. These include the various 45-minute expresses between Liverpool and Manchester, most of which, however, continue on to eastern destinations. In addition, there are trains which travel *via* Wigan and Bolton direct across to Rochdale, there connecting with trains from Manchester to Leeds, Bradford, York, Hull, etc., and some of these have through carriages from Liverpool and occasionally take the form of through trains. In earlier days there was a substantially hourly service of 40-minute non-stop trains between Liverpool and Manchester in each direction, this involving very hard locomotive work, especially with the heavier trains, in view of the steep gradients of the route each way and the need for careful running at certain places. Even in those days, while the majority of the trains continued through to eastern destinations, it was necessary to interpolate here and there a light train of three coaches running locally between Liverpool and Manchester. More recently, a standard time of 45 min. has been adopted for the run, and in view of the fact that both the shorter London and North Western route and that of the Lancashire and Yorkshire are now London Midland and Scottish, it is only to be expected that the frequency of service should be maintained by associating the two routes instead of attempting to make each meet public requirements fully on its own account.

There still remains, however, quite a substantial list of these Liverpool-Manchester trains, in that there are such trains from Liverpool (Exchange) at 8.35, 9.40 (N.S.), 10.55, 11.35 a.m., 12.35, 1.50 (S.O.), 2.0, 2.30, 3.40, 4.35, 6.35, 8.25 (S.O.) and 8.40 p.m. From Manchester (Victoria) there are trains at 9.25 (S.O.), 9.30 (N.S.), 9.35 (S.O.), 10.50, 11.50 a.m.; 12.35, 1.35 (S.O.), 2.35, 3.30 (N.S.), 4.30, 5.30 (N.S.), 6.30, 9.23 (S.O.) and 9.35 p.m., together with two or three other trains which take a little longer, usually because of calls at Bolton or Wigan, or both places, and in view of the additional mileage thus entailed. On Sundays, however, there is only one 45-min. non-stop express from Liverpool at 8.40 p.m., and none in the opposite direction, though both ways there are several trains which give good facilities between the two cities.



GENERAL VIEW, MAIN LINE SIDE OF STATION.

Although these trains carry a good deal of traffic between Liverpool and Manchester, they also have important work

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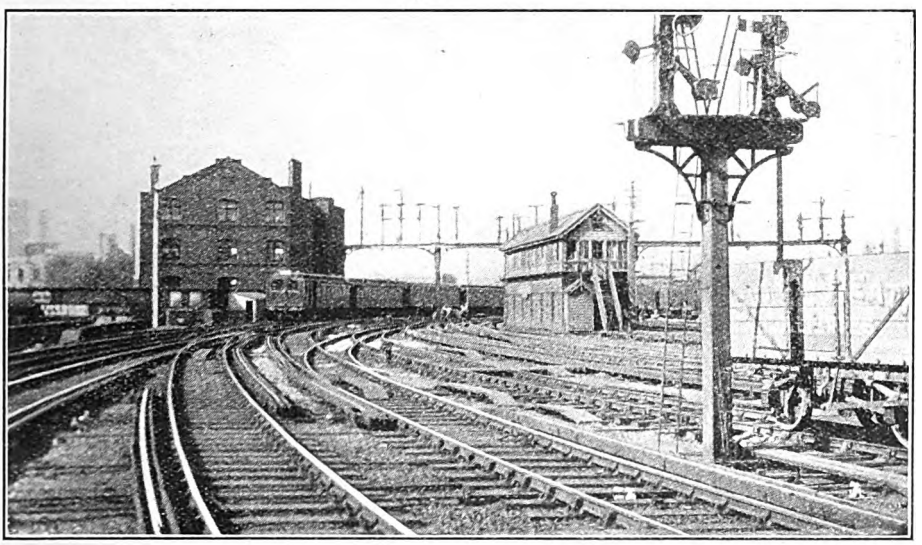
east of the latter city, and it will be of interest to review the actual work of these trains, together with the services *via* Rochdale, avoiding Manchester, which are also associated with services from Liverpool to Yorkshire destinations and beyond. The 8.35 a.m. from Exchange is a through express for Leeds and Bradford, calling at principal stations beyond Manchester. The 9.2, except on Saturdays, proceeds *via* Wigan and Bolton to Rochdale, there connecting with the 10.8 a.m. from Manchester for York and Scarborough, both sections including through carriages for Hull (Paragon). On Saturdays, however, the Liverpool train runs separately as a through train from Liverpool to both Hull (Paragon) and York. The 10.55 a.m. is a restaurant car train through from Liverpool (Exchange) *via* Manchester to York and Newcastle, running non-stop from Manchester to Wakefield. The 9.40 (N.S.) and 11.35 a.m. are combined Leeds and Bradford expresses; and the 12.35 p.m. is a through train for Bradford. The 1.3 p.m. is another train travelling direct to Rochdale and connecting with a through express for Leeds and Bradford. The 1.50 p.m. is a relief on Saturdays to the ordinary 2 p.m., and runs through from Liverpool and Manchester to York. On other days the 2 p.m. includes the Liverpool and Manchester coaches through to York and Hull (Paragon), together with a section which proceeds to the Riverside station at Hull on Wednesdays during the season to connect with the steamer to Zeebrugge. On Saturdays, however, the 2 p.m. consists only of the Hull (Paragon) and Hull (Riverside) sections. On Saturdays the 1.50 p.m. runs non-stop from Manchester to Brighouse, and the 2 p.m. through from Manchester to Wakefield, calling at Huddersfield, whereas on other days of the week the 2 p.m. calls at Brighouse. The 2.30 p.m. is for Leeds and Bradford, while the 2.45 p.m., travelling direct to Rochdale, connects there with a through train from Manchester to York. The 3.40 p.m. is another Leeds and Bradford express, while the 3.55 p.m. is another train to Rochdale, connecting with the 5.10 p.m. from Manchester to York. The 4.35 p.m. is a restaurant car express for Leeds and Bradford, while the 4.42 p.m. (except on Saturdays) and the 4.58 p.m. (on Saturdays only) provide another service to Rochdale direct in connection with trains from Manchester for destinations beyond. The 6.35 p.m. is a through train from Liverpool and Manchester to York, while the 7.15 p.m. provides another service *via* Rochdale for Bradford, etc. The 8.25 p.m. constitutes a Saturday relief for Bradford to the 8.40 p.m., which on each week-day includes



GENERAL VIEW, SHOWING ELECTRIC TRAIN LEAVING.

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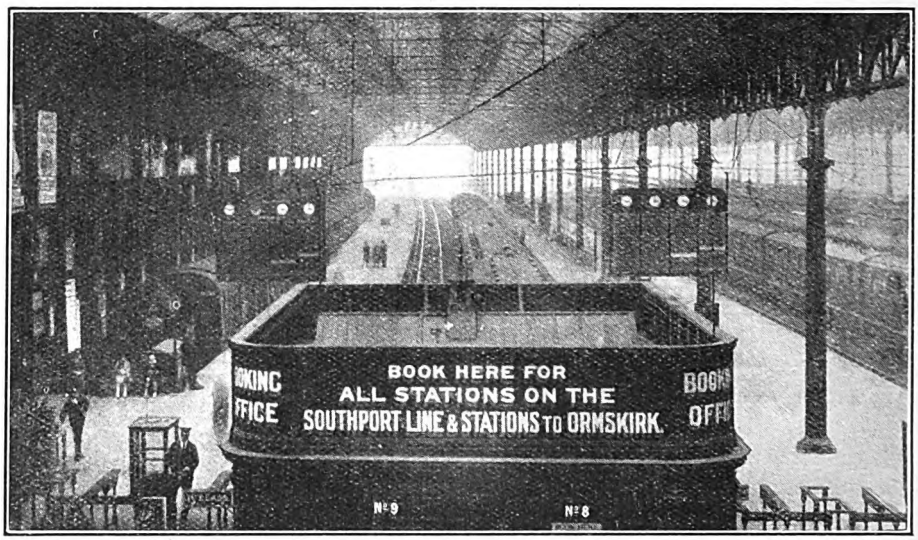
Leeds as well as Bradford sections. The 9.5 p.m. on Saturdays serves Wigan, Bolton, Bury and Rochdale, while the 9.12 p.m. *via* Manchester enables passengers to travel from Manchester as far as Todmorden, except on Saturdays, or to Hebden Bridge on Saturdays. On Sundays the 7.55 a.m. from Liverpool (Exchange) provides for connections *via* Wigan and Bolton, with trains for stations to Leeds, Bradford, Wakefield, etc., but the first express is the 12.30 p.m., which is a through train from Liverpool and Manchester to York. The 2.15 p.m. allows of Yorkshire destinations being reached *via* Rochdale, as also the 5.30 p.m. The 8.40 p.m. non-stop to Manchester continues through to Sowerby Bridge, while the 8.50 p.m. travels *via* Wigan and Bolton to Manchester.

So far as the Liverpool-Preston route is concerned, the principal trains from Liverpool (Exchange) are the 1.50 a.m., which connects at Preston with expresses for Scotland, the Lake District and other destinations ; the 6 a.m. through train to Blackpool, and the 7.50 a.m. through train to Carlisle. The 8.40 a.m. is a through train to Blackpool (Talbot Road), while the 8.50 a.m. is a through train to Blackpool (Central) *via* Meols Cop, not calling at Preston. On Saturdays there is still another train from Liverpool to Blackpool (Talbot Road) at 9.40 a.m. The 9.47 a.m. conveys through coaches for Edinburgh and Glasgow, the Glasgow portion including a restaurant car, and, except on Saturdays, through carriages for Blackpool (Talbot Road). On Saturdays this train is announced to convey passengers for Carlisle and beyond only. Then comes the 11.10 a.m. through train to Blackpool (Central) on Saturdays, and the 12.30 p.m. through train to Edinburgh and Glasgow, with restaurant car on the Glasgow section. Next is the 1.13 on Saturdays only for Blackpool (Central), and the 1.45 p.m. with through carriages to Windermere and Whitehaven. The 3.20 p.m. is the afternoon express from Liverpool to Edinburgh and Glasgow, while the 4.5 p.m., although a comparatively slow train, affords a wide range of connections beyond Preston. The 4.40 p.m. (not Saturdays) is an express for Blackpool (Central), not calling at Preston, but also conveying vehicles for Blackburn, Accrington and Burnley. The 5.7 p.m. takes through carriages for Glasgow, and, except on Saturdays, through carriages for Windermere also. The 5.48 serves a number of destinations beyond Preston, as also the 7.55 p.m. on Saturdays. The 9.10 p.m. is another through train to Blackpool (Central). On Sundays the trains to



INTERIOR OF STATION, ELECTRIC SIDE, SHOWING SPECIAL TRAIN INDICATORS.

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Preston are the 7.20 a.m., 1.40 p.m., 2.10 p.m., with through carriages for Glasgow, 5.15 p.m., and 9 p.m. It will, of course, be understood that these trains afford a wide range of connections beyond Preston, and thus serve, either by connections or by through services, Blackburn, Accrington, Burnley and Colne, together with Lancaster, Morecambe, Blackpool, etc. There are also services available by electric trains between Liverpool (Exchange) and Ormskirk, connecting with local trains serving the remainder of the route to Preston. In addition, there are a number of more or less local trains on various routes, though, in some instances, intermediate stations are provided for by connections with Liverpool electric services, as in the case of those to Ormskirk and the Preston route, or *via* Southport. Speaking generally, the more important expresses, also certain other steam trains, are sent from platforms Nos. 3, 4, 5 and 6. A service also runs between Liverpool (Exchange and Scotland *via* Blackburn and Hellifield. The 9.15 a.m. train from Liverpool (Exchange) connects at Blackburn with the 9.20 a.m. express Manchester (Victoria) to Hellifield, which conveys through carriages to Glasgow and Edinburgh, and the 2.53 p.m. connects at Hellifield with the 11.45 a.m. express London (St. Pancras) to Edinburgh and Glasgow. Trains in the reverse direction arrive Liverpool (Exchange) at 4.25 and 6.23 p.m., which are in connection at Blackburn with through trains from Scotland.

On the arrival side the usual platforms are Nos. 2, 3, 4 and 5, and, occasionally, No. 6. Trains in general correspond, of course, with the outwards trains reviewed in greater detail, so that the following brief summary will suffice. From Yorkshire and other eastern destinations: the 8.12 a.m. brings forward through coaches from York to Liverpool, which reach Manchester at 5.16 a.m.; 9.30, 10.11, 10.15 (10.20) (S.O.) and 11.11 a.m. from Leeds and Bradford ; 11.35 a.m. from Normanton and Wakefield and, except on Saturdays, from Leeds and Bradford also ; 12.35 p.m. from Hull (Paragon) *via* Manchester, and on Tuesdays and Saturdays from Hull (Riverside) in connection with the Continental steamer from Zeebrugge ; 1.20 p.m. from Leeds and Bradford ; 3.20 p.m. from Leeds and Bradford in connection with a train from York to Manchester ; 4.15 p.m. (except Saturdays) from Leeds and Bradford, and 4.28 p.m. on Saturdays only from Bradford, etc., *via* Rochdale ; 5.15 p.m. from Halifax in connection on Saturdays with a through train from Newcastle and York to Manchester ; 6.15 p.m. (not Saturdays) from Leeds and Bradford ; 7.15 p.m. from Leeds and Bradford in connection with a train from Scarborough and York to Manchester ; 10.8 p.m. (Saturdays only) and 10.20 p.m. (except Saturdays) restaurant car express from Newcastle and York to Liverpool, with through carriages from Hull (Paragon), which is replaced on Saturdays by the train due at Liverpool at 10.8 p.m., constituting the restaurant car portion from Newcastle, and the 10.20 p.m. bringing the Hull portion. On Sundays, arrivals at Liverpool (Exchange) are 10.3 a.m.; 1.53 p.m.; 2.58 p.m. through train York to Liverpool ; 6.29 ; 10.23 and 10.32 p.m. Besides these, as on weekdays, trains due at 10.11 and 11.11 a.m., 12.6, 2.51 and 4.28 p.m. come direct from Rochdale or beyond.

From the Preston direction, the principal arrivals are those at 9.48 a.m. from Fleetwood and Blackpool (Talbot Road) ; 10.40 a.m. from Blackpool (Central) and (except Saturdays) from Windermere ; 2.32 p.m. from Blackpool (Central) (Saturdays only) ; 2.40 p.m., with through carriages from Glasgow and Edinburgh ; 4.18 p.m., with restaurant car and through carriages from Glasgow ; 4.37 (Saturdays only during the season) from Windermere ; 5 p.m. from Windermere (except Saturdays, and on Saturdays when the train due at 4.37 p.m. is not running) ; 7.20 (not Saturdays) and 7.29 p.m. (Saturdays only) Glasgow and Edinburgh to Liverpool ; 9.10 from Blackpool (Central) *via* Meols Cop ; and 10.33 p.m., with through carriages from Glasgow and Edinburgh and restaurant car from Glasgow, with, of course, the same variety of facilities from stations beyond Preston. Also, various trains serving intermediate places and providing further facilities as in the case of the outwards trains previously described. On Sundays the principal arrivals from this direction are 10.52 a.m.; 4.32 p.m., with

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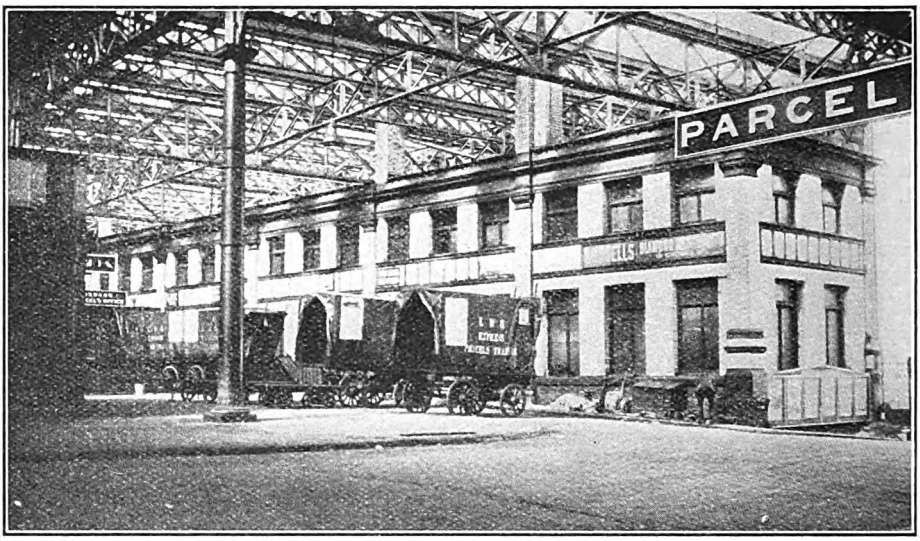

INWARDS PARCELS DEPARTMENT.

through carriages from Glasgow ; 4.40 p.m., 6.37 p.m. and 10.1 p.m.

A few remarks must now be added in regard to the electric trains. Although not running at necessarily equal train intervals, there are through trains practically every 10 minutes from Liverpool (Exchange) to Hall Road, *via* Bootle and Seaforth and Litherland (connections with Liverpool Overhead services), while alternate trains continue through to Southport (Chapel Street), thus providing a substantially 20-minute service. At busy periods, that is, on Saturday afternoons and on other weekday evenings, as also in the inwards direction during the morning period, these services are practically doubled by the interpolation of fast or semi-fast trains to and from Southport and additional trains as far as Hall Road. On Sundays there is a regular 20-minute service of trains running throughout from Liverpool to Southport.

In addition, there are electric trains from Liverpool (Exchange), some terminating at Aintree, but a good proportion continuing through to Ormskirk. Here, also, the service is substantially a 20-min. one to Ormskirk, with a fair number of additional trains as far as Aintree. There are also a number of trains, distributed over the day, to Aintree *via* Bootle and Linacre Road. The electric trains are, of course, shortened or lengthened to suit the varying traffic demands of different periods in the day, though a good time-table frequency is maintained all the time there is any need therefor. At certain periods, such as Bank and local holidays, it is necessary to amplify the Southport services very considerably, while in connection with the Grand National at Aintree a special intensive service of electric trains has to be operated. For Bank Holidays special train services are prepared, and these include a number of non-stop trains running direct from Liverpool (Exchange) to Southport (Chapel Street) in 30 min., while stopping trains run at least half-hourly and during the busy parts of the day at substantially 15-min. intervals, with a few trains starting intermediately. At some period of the day the service is, in fact, more intensive still, as is shown by the fact that in the August Bank Holiday special time-table there were trains for Southport leaving Liverpool (Exchange) at 12.2, 12.15 (one stop only), 12.17, 12.30 (non-stop), 12.32, 12.45, 12.47 (non-stop), 12.57 (one stop only), 1 p.m. (one stop only) ; while an example of the return trains is afforded by the following list of arrivals at Liverpool (Exchange) booked between 8.2 and 9.2 p.m.—8.2 and 8.6 (semi-fast), 8.9 (non-stop), 8.14 (all stations), 8.21 and 8.26 (semi-fast), 8.29 (non-stop), 8.34

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(all stations), 8.42 and 8.48 (semi-fast), 8.52 (non-stop), 8.54 (all stations) and 9.2 (semi-fast).

For the Grand National traffic at Aintree, a special intensive service of electric trains by the respective routes is operated, so as to provide practically continuous facilities. These include no fewer than 50 electric trains sent out for Aintree stations alone between 10.30 a.m. and 2.30 p.m., while it is usual to receive 36 return trains in 2½ hrs. This traffic has involved as many as 33,000 passengers despatched in three hours. An interesting feature of the Aintree traffic is that, apart from the trains serving the course directly, there is a substantial traffic to Fazakerley Station, from the vicinity of which some of the "jumps" of the Aintree Course can be seen, especially Bechers Brook, and a special steam train service is operated for this traffic. Emphasing the volume of the Grand National traffic, it must also be remembered that there are numerous steam trains from all parts of the country directed upon the stations serving the Course, so that the operation of traffic is very much more complex than were the Liverpool-Aintree trains only concerned. Incidentally, a good many of the long-distance Grand National specials are stabled in the vicinity of Fazakerley. A further interesting side light upon this traffic is that on the Sunday preceding the Grand National, sometimes known as "Jump Sunday," large numbers of passengers go out to the Aintree stations and suitable numbers of special trains are run for this traffic, for which excursion tickets are issued. The attraction is that visitors on this day are able to inspect the Course, a small admission fee being charged, the proceeds of which are devoted to local hospitals, etc.

In conclusion, the writer would express his indebtedness to Mr. J. H. Follows, Vice-President; Mr. C. R. Byrom, Chief General Superintendent; Mr. A. Newlands, Chief Engineer; and Mr. G. H. Loftus Allen, Advertising and Publicity Officer, in regard to facilities for observing the traffic at Liverpool (Exchange) Station, and to the Station Master, Mr. Abram, and his two Chief Inspectors, Messrs. T. Blanchard and G. Caine, who assisted so materially on the occasion of his visit.

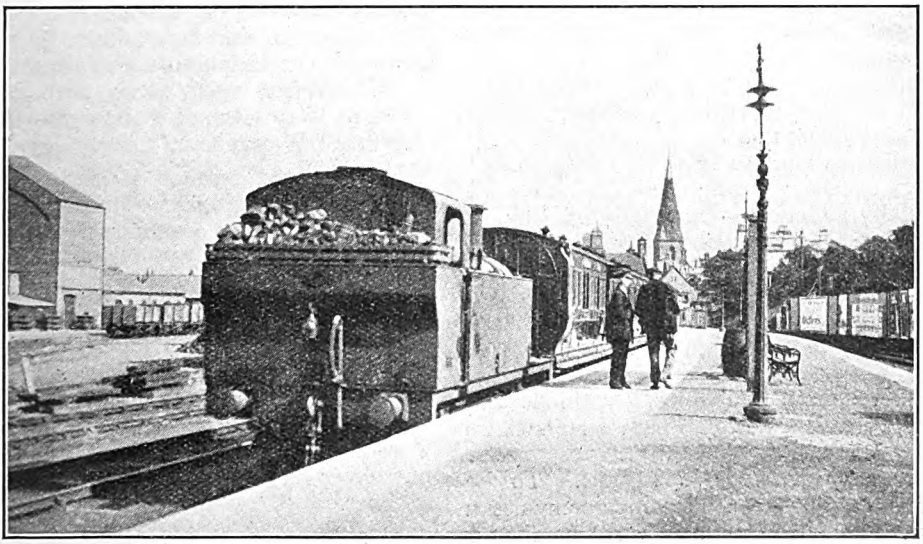

Photo.] [*J. F. Gairns.*

WIRRAL SECTION TRAIN (L.M.S.R.) AT NEW BRIGHTON.

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Reminiscences of a Retired Great Western Railway Superintendent.

By G. GRANT

(*Formerly Divisional Superintendent at Chester and Plymouth. Mr. Grant retired in* 1911.)

AFTER forty-seven years' service with the Great Western Railway, in various positions, in distant parts of the country, I recall some events with which I was connected. The records of early years were written long ago. Others are from my observation and personal notes. In no way is it a history of the whole railway, but of two among twelve divisions.

In my first ten years I was engaged upon lines of Brunel's 7-ft. gauge. I have referred to its drawbacks and costly working. After 1873 I was concerned with the ordinary narrow gauge, incidentally with those of 23 and 15 inches. From January, 1874, I was connected with supervision. Owing to the manager's absence I had continually to act upon my own initiative, that is why I write in the first person.

My service may be summarised thus: Ten years as clerk and stationmaster; eleven as assistant to and seven as district goods manager; twenty years as superintendent, twelve at Chester and eight at Plymouth. I thus had a practical acquaintance with railway working and administration.

I had two advantages, (1) I was blessed with excellent health and (2) was continually passing through beautiful English scenery. I travelled altogether about a million miles, by all kinds of trains, passenger, mineral, ballast special and on shunting engines, yet never witnessed anything more injurious than a pinched finger. During thirty years I slept in London about 300 times, Bristol 90 and other towns somewhere between Penzance and Manchester 100.

I have given few statistics. To be of value, they require so much comparison with past events as to be wearisome. Nor have I quoted from the many volumes that have been written in criticism of or in defence of railways, nor from my railway news cuttings of sixty years. I prefer to rely upon my own observations.

There was no strike among the employees under my supervision. I have but briefly referred to wages. In 1864 the rate for new men in the country districts was for the first three years 15s., 16s., 17s. with clothing. In 1910 that scale was 1s. a week higher, but it is no criterion of the wages actually paid. Hundreds of thousands received sums between 25s. and 70s. or more. Recent years have so changed the rates of pay that all former scales are eclipsed.

In recent years the G.W.R. has issued some beautiful books about the castles, abbeys and cathedrals situated in the districts served by the line, putting into the shade the little pamphlets we wrote, and were proud of, thirty years ago. Mr. McDermot has written a complete history of the line. Among interested readers will be those who have been engaged upon it, in districts where strenuous battles were fought and won. No other railway has had such vicissitudes. Its two gauges, mode of signalling, its many branch lines in purely agricultural districts. What was once termed the "Great Way Round" has become a "Shortest Way There."

I have lived through some interesting events of the company's history and I hope, although in a minor way, helped in its progress.

Bridport. Early Days.

At the age of sixteen I wished to enter the service of the Great Western Railway. For six weeks I walked eight miles a day to get some insight into railway accounts. I went to a station and copied invoices, but never made out an original or issued a ticket.

The Directors accepted me as a probationer for three months, without any educational test. On July 26th, 1864, I was instructed to report myself to Mr. Graham, the Superintendent, at Bristol. I was so excited that the beauties of the

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Thames Valley were lost upon me that day.

Next morning I was introduced to Mr. Graham. He told a Mr. Capelton to give me some duties. These consisted in folding excursion notices for the six Deputy Superintendents then serving under Mr. Graham, at Bath, Chippenham, Swindon, Gloucester, Trowbridge and Weymouth. Following my schoolboy practice, when I made a mistake in writing and erased it, Mr. Graham saw me and said it must not be done. In my simplicity I asked what I ought to do? His reply was, "Don't make mistakes."

Everything relating to the railway attracted me. I used to watch the working of the lifts by which goods wagons were raised from the low level of the warehouse to the main line. Only two wagons could be dealt with at a time, the process was slow and the increasing traffic got more and more into arrears.

When I had been at Bristol a fortnight, Mr. Graham said I was to go as clerk to Bridport. He spoke kindly, "Now, Mr. Grant, you are young and have had little experience; I should advise you to rise early and keep your work well up to date."

For the next nine years I was under Mr. Graham's supervision. He was an early pioneer of the Great Western Company. To him, that line meant the 118 miles from London to Bristol. He used to refer to South Wales and the North as the Gloucester branch and the Birmingham branch. Correspondence between his office and stations was conveyed in leather cases. No officer in my time equalled Mr. Graham in the excellence or brevity of letter writing.

I knew nothing of Bridport. This date, August 15th, 1864, was the first time I travelled in a first-class carriage. In those days the Englishman's desire for exclusiveness was met, on the broad gauge, by dividing first-class compartments into two sections with a sliding door across the middle.

At Maiden Newton I had to change. The stationmaster came to me and said: "You will find 'Webber' a troublesome old man." About which the sequel will tell.

I reached Bridport at noon. The clerk whose place I was to fill had left. His

MR. THOMAS GRAHAM,
An Early Superintendent of the Bristol Division.

duties were being carried on by porters. After reading the letter I had brought, the stationmaster's disappointment was evident. "What experience have you had? What stations have you been at?" explained that I had had no definite post, but had copied invoices into a book. He told me to begin at once, and make out those for the day. I had everything to learn. How were invoices prepared?

A shipping note with some particulars on it was given to me. The goods were for "Wool" Where was that? In what part of the Rate-Book should I find Wool rates? The book had been much used, and had no index. I was told it was on the South Western line. When I found that company's Rate-Book, Wool was among several pages of names inserted, in no sort of order. Having the rate I then had to look among the thousand articles in the Railway Classification to see the class to be charged. That was one of forty entries to be invoiced. While doing this, I was several times asked for tickets. A passenger wanted one for Grimston. Where in the case should I find Grimston tickets? Four stations were in order, others irregular. To some there were tickets only for one class, to many there were none; paper tickets had to be written. I was told the invoices must be ready and press-copied by 1 o'clock. I had help from a porter, from the stationmaster none. He was fretting because the train might not leave to time.

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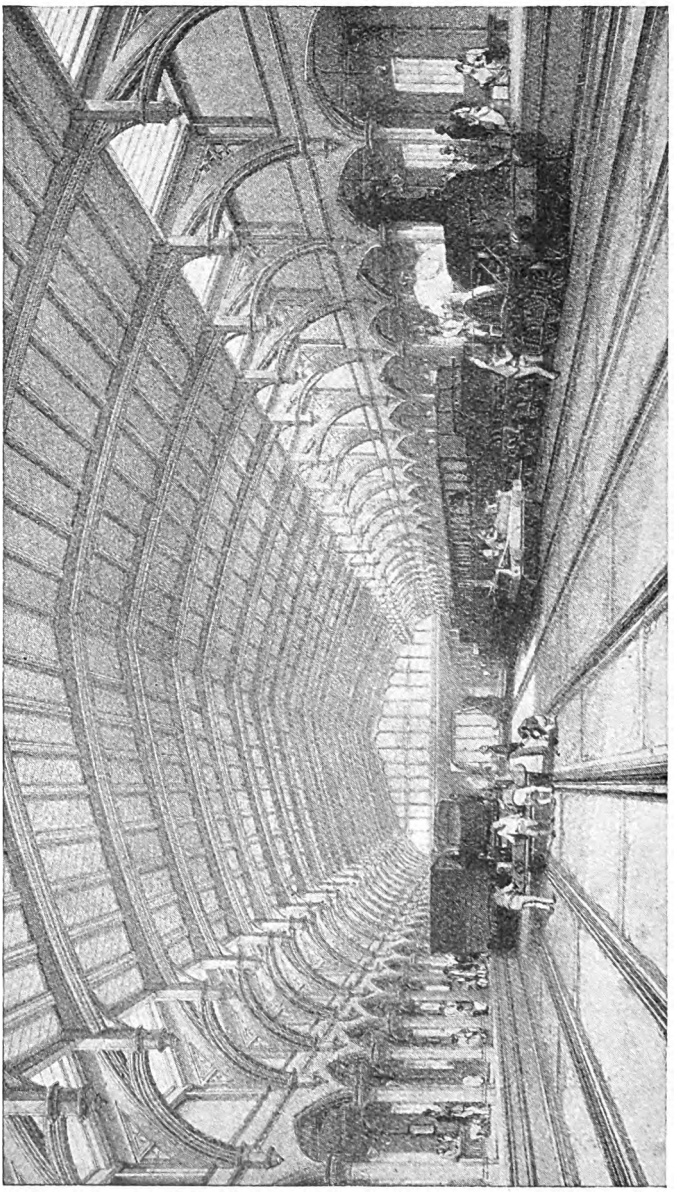

BRISTOL STATION IN EARLY DAYS.

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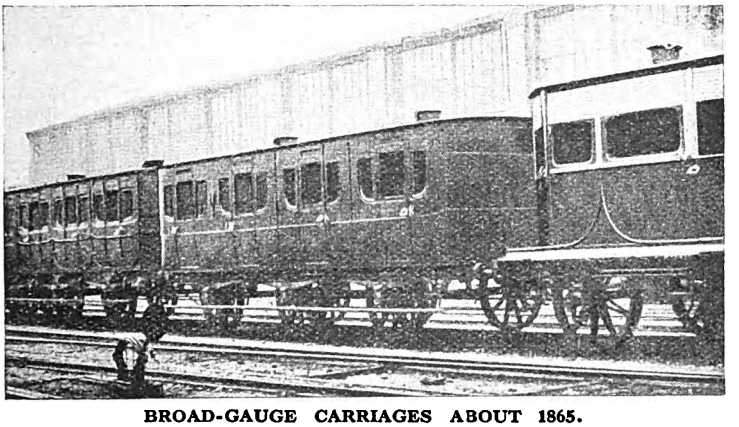
Tickets were numbered consecutively. Each class had a separate column in the issue-books. When a train had gone, cash was compared with the entries therein. Discrepancies arose, such as entering a third-class ticket in the second-class column. The monthly return had to show how many tickets of each class had been issued and to what station; the total should agree with the cash remitted. On invoices there were three columns. The first represented sums paid to local carriers, the second where carriage was paid by senders, the third other stations had to collect from receivers of goods. At the month's end the totals relating to each station were sent to the Audit Office. Should the figures given, say, by Weymouth, not correspond with those given by Bridport, the difference was followed up until they agreed.

The last passenger train left Bridport at 7.10 p.m. and returned at 10. This interval I used, but could not complete the entries that night.

Following the advice of Mr. Graham, I went next morning to the station at 6 a.m. and did the work left undone the previous night. After breakfast, I began to issue tickets for the first train, which left at 9 a.m. My lack of knowledge about localities and rates made it difficult to get the invoices ready by 1 p.m. This day, when I had finished them, the guard asked for a Stations Truck List. This was something new. I had to copy upon it particulars of all goods loaded in a certain truck.

Next morning I was asked for a ticket to "Martik." A porter told me it was Martock, between Yeovil and Durston. There were no card tickets for Martock; I had to write paper ones. Each meant writing three sections. There was a fair there, and I had to issue 20 by that train. In cases such as this the stationmaster never assisted.

When the midday train had gone, he asked me what ticket I had given to a passenger for London. I said a second-class; it should have been an "express" ticket at a higher fare. The anomaly was that the passenger did not join an express train until he reached Chippenham, 70 miles away. Third-class tickets were only available by one train in the day.



BROAD-GAUGE CARRIAGES ABOUT 1865.

In the evening I was asked to call out some figures from books while the stationmaster wrote them down. When nearly completed it was discovered that figures from a black book had gone on a red form and the contrary. He was furious with me, although I was standing close beside him, and he could see the book I was using. "Tut, tut, tut!" he shrieked. "You are evidently not fit for the position."

I had little sleep that night. This man would have to report on my fitness for service, and within three days he said I was incompetent. However, next morning at 6 a.m. I was again at the station clearing up any outstandings from the previous day.

Perhaps I may here say something about John Webber, the stationmaster.

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He was a man of small physique, a bachelor, nearly 60 years of age. He had occupied more important positions; he was fretful and fidgety, unrelieved by an occasional smile or spark of humour. He did not supervise. Anything out of the usual course must be told him in the office. Business with traders in the town was done through Mr. Lamb, the cartage agent. As the line was worked by one engine it demanded little attention. He left each employee to himself ; was not vindictive, and was charitable in his peculiarly religious way. His only friend, as far as I know, was a local poet, named Flint, the author of a poem, "St. Dunstan and the Devil."

I was at the office until 10 p.m. on August 31 and at 6.15 a.m. on September 1, and made a correct balance of my invoicing accounts before breakfast. During the morning I completed my monthly ticket issue. When I told the stationmaster he said:—

"I think you should now get on with your Goods Abstract."

"That," I replied, "was done before breakfast."

He never referred again to my unsuitability and became passively civil.

Passenger tickets issued to other broad-gauge lines had to be analysed by the issuing station. The fare to Plymouth was 10s. 2½d., which was shown G.W. 1s. 10d.; B. & E., 4s.; S.D., 4s. 4½d.

With October came a great influx of traffic. The manufactures of Bridport were twine, canvas, and fishing nets. This was the season for export. All was sent under mark. Several traders' marks resembled each other, which caused difficulties in checking. Liverpool was the port for most of these goods. That being on the narrow-gauge line, all traffic, as also that for Hull, had to be sent to Didcot for transfer.

I may here refer to what this meant. Goods sent from all places on the broad-gauge lines in Wilts, Somerset, Dorset, Devon and Cornwall were not only liable to one or two days' delay but to miscarriage should goods reach Didcot unaccompanied by an invoice or be wrongly loaded there. Liverpool might receive the correct number of articles, but one or more had been crossed at Didcot. Cases had occurred where a bale for Hudson's Bay had gone to Scandinavia. The expense and delay thus incurred owing to the different gauge can be imagined with thousands of tons of traffic a month to be dealt with.

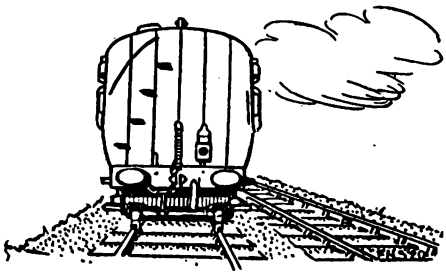
I was now on the permanent staff. On a dull, cold November Sunday I spent eight hours at the station in arranging a new ticket-case and transferred the tickets ready for use on Monday morning.

Weymouth was Dorset people's ideal seaside town. I heard of Christchurch, Poole, Swanage, Wareham, but never of Bournemouth.

On a day in May I was instructed to proceed to Westbury. I had not asked for a removal. I learned later that the change was made to hasten the resignation of the stationmaster, which took place three months later.

(*To be continued.*)

(*Illustrations from E. T. McDermot's "History of the Great Western Railway."*)



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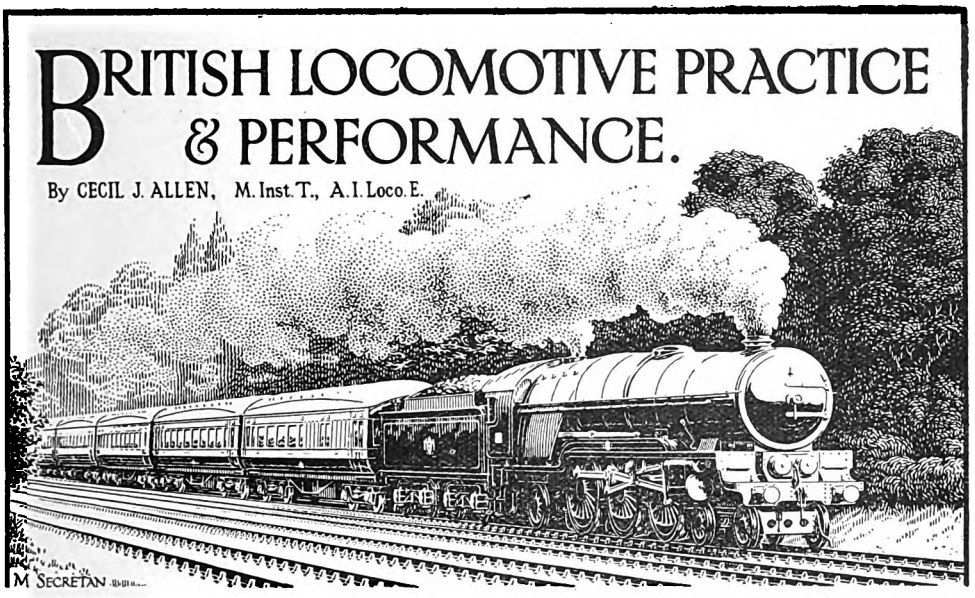
BRITISH LOCOMOTIVE PRACTICE & PERFORMANCE.

By CECIL J. ALLEN, M.Inst.T., A.I.Loco.E.



IN the June, 1928, issue of the RAILWAY MAGAZINE I wrote on locomotive developments which were taking place at that period, and commented on the fact that notable improvements and radical developments in locomotive engineering were, for the most part, to be found in American and Continental practice. To be able now to write on the most remarkable locomotive novelties produced during the year 1929 is thus, in this connection, of the greater moment. For not only is the so-called "hush-hush" engine of the London & North Eastern Railway an all-British product in conception as well as execution, but—although the assistance and experience of an outside firm has been called in to deal with the peculiar problems involved in the adaptation of a water-tube boiler to a locomotive *chassis*—the whole scheme of design appears to have been worked out *ab initio* by the Chief Mechanical Engineer of the L.N.E.R. and his department. The only minor particular over which it is somewhat difficult to wax enthusiastic is that of appearance; externally the new machine is, as a result of the systematic streamlining which has been carried out, the most fearsome apparition that British rails have yet been called upon to carry.

It may be added that this external contour was arrived at after considerable research on the part of Mr. Gresley and Professor Dalby, conducted jointly at the City and Guilds Technical College in Kensington. As the enormous dimensions of the boiler made it quite impossible to mount a chimney above the smokebox, exceptional treatment was necessary in order to carry the exhaust steam clear of the cab. Wind was passed at a velocity of 50 m.p.h. through a tunnel, in which was located a model of the front end of the locomotive, and by the use of powdered chalk a species of "exhaust" was reproduced; from these experiments the external contour of the locomotive was finally settled. The result may, and doubtless will, turn out to be "a joy for ever" to its designer and its owners; but "a thing of beauty"—well, hardly!

The water-tube boiler consists, first of all, of two water-drums on either side of the firebox, each 11 ft. long and 18 in. diameter, connected by 238 tubes of 2½ in. diameter, inclined upwards, with a steam drum 3 ft. diameter by 28 ft. long, which is located along the centre-line of the engine at the highest point permitted by the loading-gauge. Ahead of the firebox are two other water-drums at a higher level, 13 ft. 6 in. long by 1 ft. 7 in., which are connected by 444 2-in. and 74 2½-in. tubes with the forward end of the steam-drum. Suitable casing carries the products of combustion through these nests of water-

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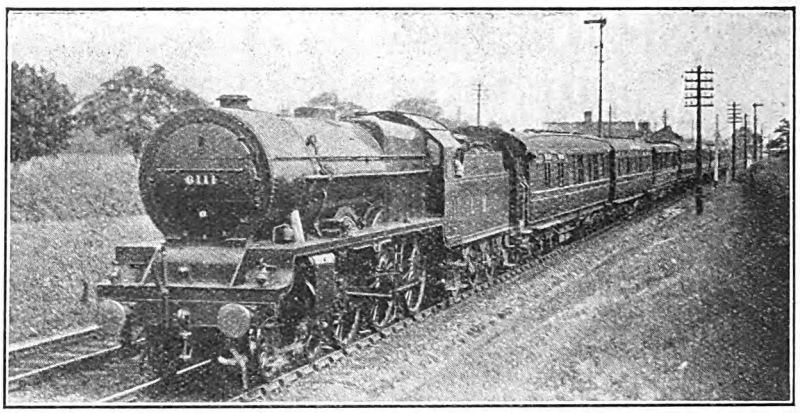

Photo.] **DOWN "MIDDAY SCOT" EXPRESS.** [*H. Gordon Tidey.*
4-6-0 No. 6111 *Royal Fusilier.*

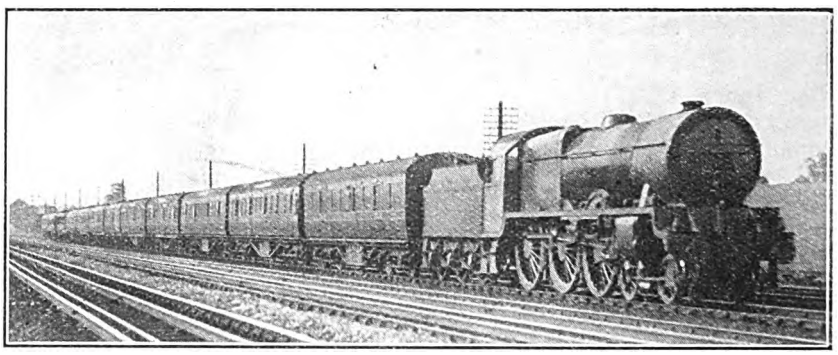

Photo.] **UP "LAKES" EXPRESS.** [*A. C. Wright.*
4-6-0 No. 6144 *Ostrich.*

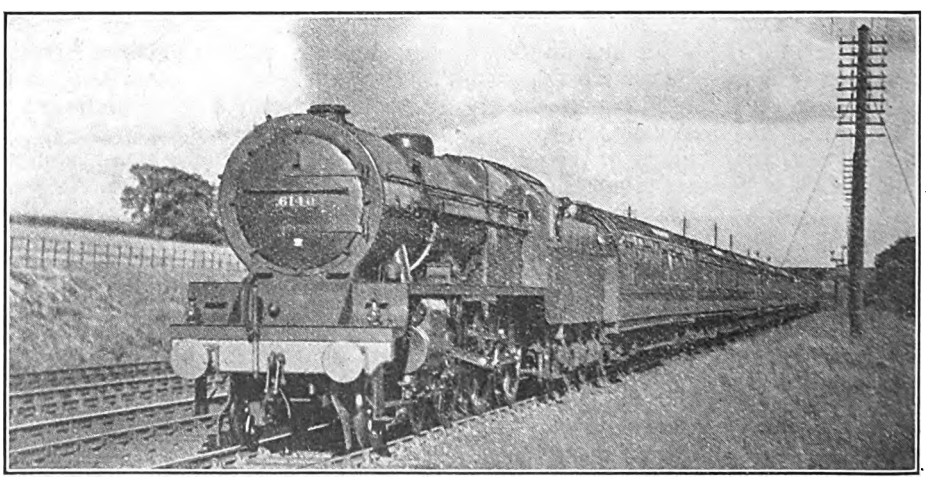

Photo.] **DOWN LIVERPOOL AND MANCHESTER EXPRESS.** [*F. R. Hebron.*
4-6-0 No. 6140 *Hector.*

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tubes—the ordinary process of steam-raising in a locomotive boiler being exactly reversed, in that heat is applied from outside to the water within the tubes, instead of from the inside of the boiler-tubes to the water surrounding them—to the smokebox. Air for combustion enters by three rectangular openings in the smokebox front, and is thus passed along the boiler from front to back, becoming heated in its passage well above the atmospheric temperature—a feature making for economy—and serving, on the other hand, to protect the boiler lagging from excessive heat.

A feature that may at first occasion a little surprise is the exceptionally small cubic capacity of the cylinders. The engine is of the four-cylinder compound type, with two high-pressure cylinders between the frames, and two low-pressure cylinders outside. The two outside cylinders are of the standard "Pacific" dimensions—20 in. diameter by 26 in. stroke—whereas the two inside cylinders are but 12 in. diameter by 26 in. stroke. Thus the high-pressure cylinders are equal in capacity to a single cylinder of 17 in. diameter by 26 in. stroke. In the aggregate, therefore, the cylinder volume of No. 10,000 is less than that of one of the ordinary high-pressure "Pacifics" carrying 220 lb. of steam. The latter are capable of working continuously on comparatively hard duties at 15 per cent. cut-off with full regulator. Any cut-off much below this figure, with Walschaert valve-motion, is for various reasons undesirable. Consequently the terminal pressure at which the new engine will exhaust its steam, seeing that the boiler pressure is 450 lb. per sq. in., appears likely to be considerably higher than before unless working is conducted with the regulator partly open, so that the engine works with a less volume of steam than is customary at normal pressures; in either event it would seem that thermal efficiency may suffer, in the former case by the throwing of unused power to waste, and in the latter by throttling. *Per contra,* it is curious that the *maximum* cut-off, limited in the Gresley "Pacifics" to 65 per cent. of the stroke, is in No. 10,000 raised to 75 per cent. in the low-pressure and 80 per cent. in the high-pressure cylinders. Doubtless further information in regard to these important points will be available as the engine gets into regular service.

A point of particular interest is that, for the first time in compound locomotive history, independent rates of cut-off in the high- and low-pressure cylinders have been arranged for without duplication of the valve-motion. Motion for the inside piston-valves is derived by rocking-shafts from the outside Walschaerts motion, in the manner customary with four-cylinder locomotives, but the inside valve-rods are attached to die-blocks which move in slots cut in the inner ends of the rocking-shafts. The driver, by means of special gear, can vary the position of the blocks in the slots, and thus can vary the percentage of cut-off in the inside cylinders relatively to that which he obtains, by the use of ordinary expansion gear, in the outside cylinders. This arrangement has been made the subject of a patent by Mr. Gresley. For increasing the starting effort, the driver is able to admit live steam direct from the boiler to the outside cylinders, but this is conducted through a pipe of only 1 in. diameter, and a special "pop" valve, communicating with the low-pressure steam chests, restricts the pressure in these chests to a maximum of 200 lb. per sq. in.

As regards weight, for the first time in British locomotive history, the 100-ton mark—apart from tank or articulated engines—is exceeded, the loaded weight of engine alone being 103½ tons. With the 62½ tons' weight of the tender a total is reached of 166 tons. The last feature of note is the provision of two axles to carry the trailing end of the engine; the forward pair of these is the customary Cartazzi axle-box employed on the "Pacifics," while the rear axle is a pony-truck of the Bissel type. As the rear end is not supported by a bogie, but by two independent axles, the 4-6-4 or "Baltic" designation is not really admissible; "4-6-2-2" is more strictly the correct notation, though this is also open to misconstruction as suggesting that one of the rear axles is booster-operated. For purposes of convenience, however, the new locomotive will doubtless be regarded as of the 4-6-4 or "Baltic" wheel arrangement.

The rival London Midland and Scot-

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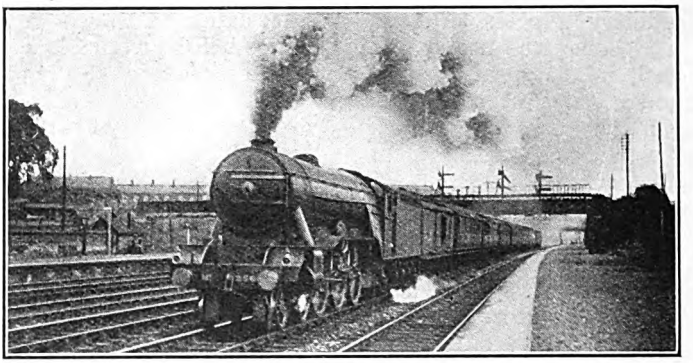

Photo.] [*C. J. L. Romanes.*

UP "SCARBOROUGH FLIER."
4-6-2 No. 2560 *Pretty Polly.*

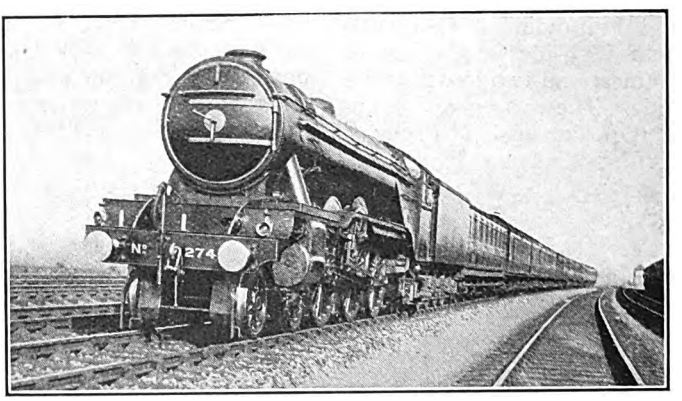

Photo.] **UP THAMES-FORTH EXPRESS.** [*R. D. Stephen.*
4-6-2 No. 2745 *Captain Cuttle.*

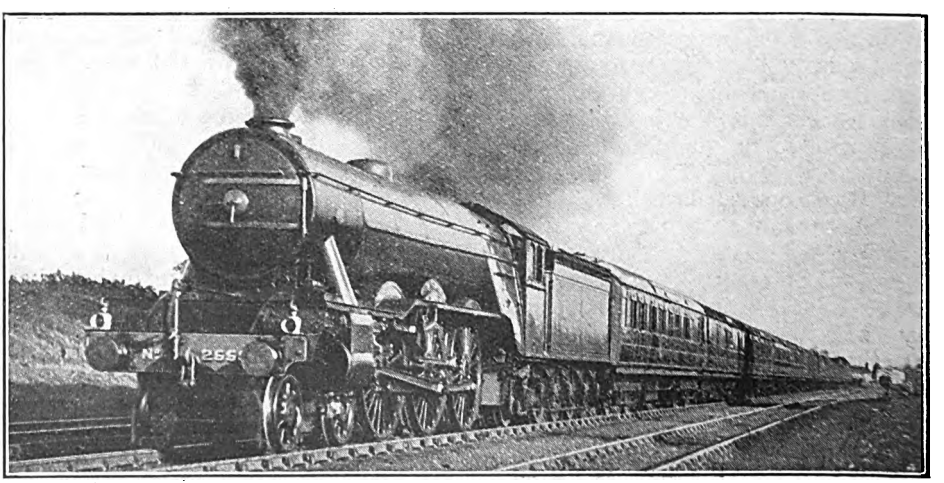

Photo.] **DOWN HARROGATE EXPRESS.** [*F. R. Hebron.*
4-6-2 No. 2559 *The Tetrarch.*

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tish 4-6-0 locomotive *Fury* is of a different type altogether; it represents a development of the Schmidt-Henschel high-pressure system already tried in Germany. Externally the lineaments of a "Royal Scot" 4-6-0 locomotive have been fairly well maintained, the boiler additions being enclosed by a casing resembling a firebox of exceptional size, and extending to the extreme height of the loading gauge. Three distinct systems of boilers are employed. The first of these consists of a "closed circuit" of pipes which form the back, sides and roof of the firebox, communicating with drums above and below. This pipe system is filled with pure water, and the steam generated in it, by immediate contact with the fire, and at a pressure of anything between 1,400 and 1,800 lb. per sq. in. (varying according to the rate of firing), is not actually employed in the propulsion of the engine. Instead, it is led by a further circuit of piping into the evaporative elements in the high-pressure steam drum, located above the two drums of the closed circuit. This drum, which is not in actual contact with the fire, contains ordinary feed-water, and the water and steam in the closed circuit, at enormous pressure, is the medium whereby steam is raised in the high-pressure steam-drum to the working figure of 900 lb. per sq. in. This steam is conducted to the high-pressure cylinder of the engine—which is also of the compound type—whence, after use, it is exhausted into a mixing chamber, or receiver.

In the ordinary locomotive-type boiler barrel of the locomotive, situated in front of the high-pressure equipment, steam is raised at a pressure of 250 lb. per sq. in. and conducted to the mixing chamber, where it is mixed with the exhaust steam from the high-pressure cylinder before use in the outside cylinders. Once again the limited cylinder dimensions of this engine are a matter for surprise, the high-pressure cylinder being only 11½ in. diameter by 26 in. stroke, and the low or normal-pressure cylinders 18 in. diameter by 26 in. stroke. As steam may be raised much more rapidly in the high-pressure steam drum than in the boiler proper, an ingenious intercepting valve is provided whereby any excess pressure from the former is exhausted into the latter, rather than being blown to waste. The cut-offs in the high- and low-pressure cylinders bear a fixed relation to each other, as in the Midland 3-cylinder 4-4-0 compounds, and the one regulator handle operates both high-pressure and low-pressure regulators simultaneously. The engine in working order weighs 87 tons, or 2 tons only more than a "Royal Scot" of the ordinary type, and of this total 63 tons are available for adhesion.

Despite the usual purely speculative claims as to speeds of "a hundred miles an hour," the haulage of far heavier loads, and other remarkable exhibitions of tractive prowess which most of the newspapers have already credited to the new engines, it is hardly necessary to add that such are not the objects of the new developments. Both locomotives represent praiseworthy and original attempts to raise the extremely low 7 or 8 per cent. overall thermal efficiency figure of the steam locomotive of traditional design, which, even in the best test circumstances, is the highest that has yet been attained. That is to say, economy in coal and water consumption is the chief aim. The mere fact that in neither case is the nominal tractive effort of the new engines appreciably in excess of that of the existing types against which they will be tried, should in itself be sufficient evidence that increased tractive power is not sought. In the London and North Eastern case, in particular, what would be the object of a much higher tractive effort? Only a few days before writing these lines I was watching an up "Pacific"-hauled express passing through New Barnet dead on time with a 17-coach 70-axle express, which could have weighed nothing less than 600 tons behind the tender, and must have been longer than most of the platforms at which the train had stopped *en route*. Again, with an overall speed of 47.6 m.p.h., at present apparently fixed and unchangeable in the case of the "Flying Scotsman," running speeds of 100 m.p.h. are hardly required as yet!

But these British locomotive developments are of the greatest interest as showing that the year recently passed has witnessed "the introduction of devices that may not improbably play an important

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part in the evolution of the steam locomotive—a machine which, whatever its critics may say, still shows remarkable vitality, and is not likely to be so soon superseded as might be gathered from statements in the lay Press." Such was the apt comment of our contemporary, *The Locomotive,* in its January issue. It is the repercussion from the enormous capital cost of railway electrification, now proved to be justifiable only on routes very heavily graded or carrying very dense traffic, that is focussing attention as never before on steam locomotive efficiency. Superheating has made its contribution to the solution of the problem, and, in more recent times, the general adoption of higher working pressures and longer valve-travels, rendering possible full regulator and short cut-off working, with, as a result, more complete expansion of a reduced volume of steam, has contributed yet further. In the two latest engines far higher pressures still have been incorporated, together with—a significant development indeed—a reversion to compound working. In more respects than one these may prove to be two of the most momentous locomotive developments of our time.

And now, as regards performance, the appearance elsewhere in this issue of the gradients of the North to West route of the G.W. and L.M.S. Companies, between Shrewsbury, Hereford and Pontypool Road, affords me an opportunity of describing some of the running over this line, for details of which readers have asked on numerous occasions. Over both stages of this difficult route, broken intermediately by the Hereford stop, the north-bound is the harder travelling. Between Pontypool Road and Hereford the ascent from Penpergwm to Llanvihangel, 6¾ miles in length, is the stiffest bank of the whole course; from Hereford to Shrewsbury, with minor intermissions, the tendency of the road is unbrokenly upwards as far as mile-post 13½, just short of Church Stretton—that is to say, for roughly three-quarters of the distance. In such grading conditions, and in view of the very heavy loads often hauled, timings of 44 min. for the 33.5 miles from Pontypool Road to Hereford and 65 min. for the 51 miles thence to Shrewsbury, involving average speeds of 45 and 47 m.p.h. respectively, are not by any means to be despised. The Great Western Railway is responsible for finding locomotive power for all the chief expresses over the joint L.M.S.-G.W. section between Shrewsbury and Hereford, as well, of course, as over its own line between Hereford and Pontypool Road, and in most instances the same engine works throughout between Shrewsbury, Pontypool Road and Bristol; occasionally the workings are continued through to and from Exeter or even as far afield as Newton Abbot.

The first run tabulated was of special interest as demonstrating the work of one of the new "Hall" class 4-6-0 engines. The 9-coach load of 285 tons was, however, but moderate. We were, as usual, late away from Pontypool Road. The start from here is, of course, exceptionally favourable, though high speed is seldom run down to Penpergwm owing to the sharp curve at the foot of the bank. We touched 67 m.p.h. at the foot of the dip, but were down to 45 at Abergavenny and 33 at Abergavenny Junction. The 1 in 82 was surmounted at a minimum rate of 30 m.p.h., after which we recovered to 32½ on the 1 in 95—a good effort. Top speed down to Pontrilas, where we eased to 60 an hour, was 74 m.p.h., and speed was maintained at between 55 and 60 m.p.h. until we slowed severely for Red Hill Junction. Running gently down thence into Hereford, we succeeded in cutting booked time by 4¼ min. To my disappointment, a pilot was provided from there to Shrewsbury in the shape of "County" class 4-4-0 No. 3818, *County of Radnor.* The two engines made very light work of the booking, beating all other times in the table, and fetching up at Shrewsbury over 2 min. *early*—an unusual event indeed on the North to West road! In fact, we gained 10½ min. actual time from Pontypool Road to Shrewsbury, despite 1½ min. loss by signals outside the latter station. Speed rose to 65 m.p.h. at Leominster and beyond Woofferton Junction, and fell to 56½ at Ludlow, 48 beyond Onibury, 47½ at Marsh Farm Junction—with an intervening 55½ at Craven Arms—and we had nearly surmounted the crest of the bank, at a steady 41 m.p.h., when there was a sudden drop to 34½, possibly through premature notching-up. Down to

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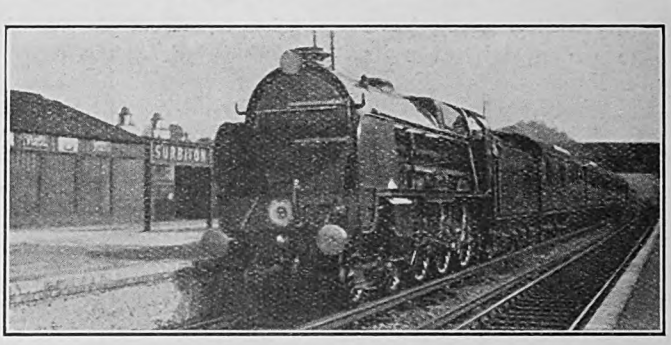

Photo.] [*P. E. R. Berry.*

DOWN "ATLANTIC COAST" EXPRESS.

4-6-0 No. E850 *Lord Nelson.*

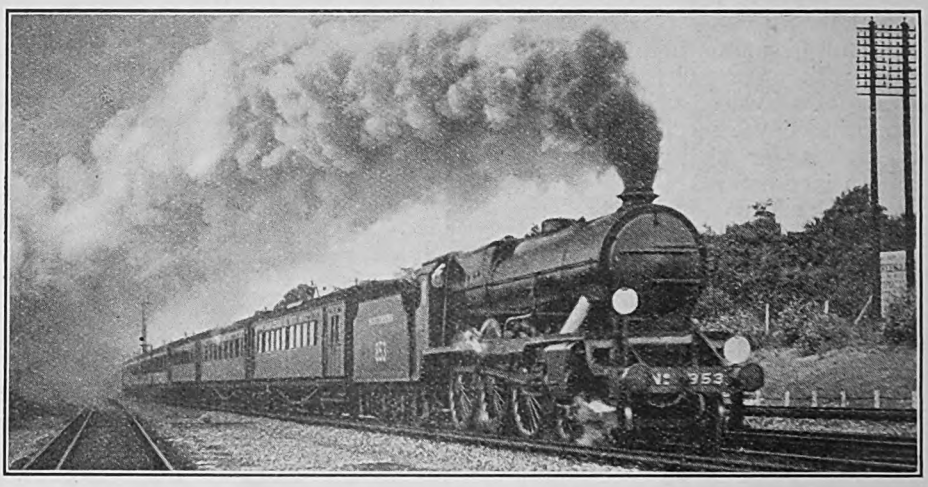

Photo.] **2 P.M. DOWN CONTINENTAL EXPRESS.** [*A. C. Wright.*

4-6-0 No. E853 *Lord Hawke.*

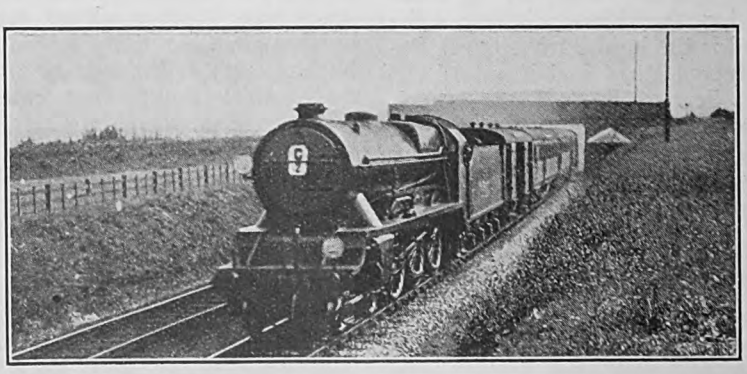

Photo.] **UP CONTINENTAL EXPRESS.** [*R. W. Airy.*

4-6-0 No. E857 *Lord Howe.*

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Shrewsbury no higher speed than 66 m.p.h. was touched. On no other occasion have I noted so much time gained on this route.

The run with *Twineham Court,* in the second column, was not a brilliant achievement, though the train was running to time and the driver doubtless felt that no particular effort was needed. We did not touch more than 53½ m.p.h. before climbing through Dinmore Tunnel, where the minimum on the 1 in 135 was 43½ m.p.h. ; then we attained 60 m.p.h. at Leominster and 59 beyond Woofferton, but interrupted this with the poor minimum of 46½ m.p.h. beyond Berrington ; at Ludlow speed fell to 44 m.p.h., on the 1 in 112 beyond Onibury to 38, but then, after passing Craven Arms at 50, we did a little better, passing Marsh Farm Junction at 43½, Marsh Farm at 46, and mile-post 13½ summit at 36½ m.p.h. Maximum speed on the descent to Shrewsbury was 68 m.p.h., and we should slightly have improved on time but for the customary signal checks from Coleham inwards.

The next run, with the 4-cylinder 4-6-0 *Danish Monarch,* was typical of running over this route. After leaving Pontypool Road we touched 66 m.p.h., but slowed to 58 round Penpergwm curve, and so commenced the ascent to Llanvihangel at a lower rate than previously. On the 1 in 82 speed fell to 21 m.p.h., but there was a recovery to 26 on the 1 in 95. After that we touched 74 an hour in descending to Pontrilas, where there was an easing to 64, and good work was done on to Hereford, with a speed of 53½ miles an hour past Tram Inn. Time was thus just kept on this stage. With the reduced load of 295 tons, *Danish Monarch* did well to Craven Arms, but made a rather poor climb to Church Stretton. We passed Moreton at 54 m.p.h., and fell to 40 through Dinmore Tunnel, after which the speeds were 60 an hour at Leominster, 54 after Berrington, 65 at Woofferton, 54 through Ludlow, 41 beyond Onibury, 49½ at Craven Arms, 26 at Marsh Farm Junction, 36 at Marsh Farm and 28 at the summit, followed by a maximum of 69 in descending to Shrewsbury. Including a signal stop outside, we just kept time ; net time was 1¾ min. under booked.

Twineham Court, in the fourth column, was responsible for some excellent running, especially with the 385-ton load which was carried to Hereford. In the Nantyderry dip we attained 60 m.p.h., followed, after a fall to 49, by 69 in the descent to Penpergwm, slightly checked for the curve. Up the long ascent speed gradually fell to a minimum of 26 m.p.h., but with 385 tons up 1 in 82 and 95 this was quite good work. Touching 72½ past Pandy, we slacked to 55 through Pontrilas, maintained a rate of 55-56 m.p.h. up most of the subsequent grades to Haywood Summit, and then, despite running in very cautiously from Red Hill, succeeded in gaining a minute to Hereford. Here the booked allowance of six minutes was lengthened out to ten—why has Hereford such a rooted objection to maintaining the booked duration of stops? On only one occasion in this table was the ample allowance of six minutes actually worked to—and we left six minutes late with a reduced load of 300 tons. I was very busy at the time, and took but little note of the speeds, except to remark that we went over the summit beyond Dinmore at 43 m.p.h. and breasted the major summit of Church Stretton at 41, by what was all but the fastest ascent from Craven Arms in the table.

Saint Cuthbert was responsible for the only failure to keep time between Pontypool Road and Hereford. We slacked from 64 to 53 m.p.h. at Penpergwm, and then did badly—by comparison with other runs—up the climb to Llanvihangel, falling to 20½ m.p.h. on the 1 in 82, and only recovering to 22 on the 1 in 95. Maximum down to Pontrilas was 71½ m.p.h., after which the speed between there and Red Hill fell below 50 m.p.h., with the result that 2¾ min. were dropped from Pontypool Road to Hereford. With 320 tons from there, *Saint Cuthbert* made some amends ; speeds were 43½ m.p.h. above Dinmore, 62½ at Leominster, 60 minimum after Berrington, 67 at Woofferton, 57 at Ludlow, 60 at Bromfield, 43½ before and 51 at Craven Arms, 36¼ at Marsh Farm Junction, and 27 at the summit. Given a clear road into Shrewsbury, the 2¾ min. lost to Hereford would have been all but regained.

Dorney Court, another 2-cylinder 4-6-0,

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made a really brilliant run with 360 tons from Pontypool Road to Hereford. We attained 71½ m.p.h. before Penpergwm, passed Abergavenny at 49, Abergavenny Junction at 35, and speed then fell to 27½ an hour, which was maintained steadily to the top. We touched 74 m.p.h. past Pandy, eased to 60 through Pontrilas, maintained 54-55 m.p.h. up to Haywood, and traversed Red Hill Junction at a rather higher speed than on the remaining journeys, after which we made an exceptionally fast run into Hereford, touching 62½ m.p.h. at Rotherwas Junction. Consequently we gained 4¼ min. from Pontypool Road to Hereford, doing the journey in under 40 min. —this in itself is a rare event—and averaging 50.5 m.p.h. from start-to-stop right over Llanvihangel Summit, with 360 tons. But it must be admitted that some of the curtailed time was attributable to higher than normal speeds at Penpergwm, and from Red Hill into Hereford. On this occasion the whole train went through unchanged to Shrewsbury. Whether or not the engine-crew was changed at Hereford I cannot say, but certain it is that the character of the locomotive work was totally different afterwards. Speeds of only 40 m.p.h. above Dinmore and 47½ at Ludlow were far below the level of most of the preceding trips ; and a p.w.r. check beyond Craven Arms further hampered the ascent to Church Stretton. With signal checks outside Shrewsbury, therefore, we lost 1½ min. on booked time.

For the remarkable run behind another of the new "Halls," No. 4934, *Hindlip Hall,* I am indebted to a correspondent. A 400-ton train was taken over Church Stretton Summit without assistance, and not only so, but a gain of over 2½ min. was achieved on booked time. Timing began at Hereford, and the speeds noted from there onwards were 57 m.p.h. at Moreton, 48 at the top of Dinmore bank, 63 at Leominster, 54 before Woofferton (followed by a slight signal check), 54 at Bromfield and 37 minimum up to Church Stretton. This was the only run of the series in which a clear run was obtained into Shrewsbury, and on it I have based the net times of the other runs between Condover and the stop in the General Station.

Last of all there is the effort of two-cylinder 4-6-0 No. 2975, *Sir Ernest Palmer,* with a 405-ton train. Passing Penpergwm at 65 m.p.h., we dropped to 34½ at Abergavenny Junction, and went right up to Llanvihangel without the speed dropping below 24 m.p.h.—a by no means discreditable effort with this load. We slacked to 55 an hour through Pontrilas, and had signals on outside Hereford, but for all that completed the first section of the course in but 15 sec. over the booked time which operates with this train, of 45 min. From Hereford, to my disappointment, we were piloted by a "County," and there was little of further interest in the run, save a minimum rate of 40½ m.p.h. at Church Stretton Summit, and the unusual maximum of 75—speed being generally kept moderate here in view of a certain amount of reverse curvature—on descending to Shrewsbury. The net gain of time on this length was 4½ min.

In conclusion, I have to mention a particularly enterprising L.M.S. run over the continuation of this route, between Shrewsbury and Crewe, wherein there was concerned a "Prince," No. 5604, *Enchantress.* When these engines are in good condition and capably driven, they are still capable of some remarkable feats. On this occasion, owing to the provision of a special dining-car portion of four vehicles for a private party to Llandrindod Wells, the 1.10 p.m. out of Crewe was made up to a 54-axle train of 395 tons tare and 415 tons gross weight. We started in excellent style, passing Nantwich at 57½ m.p.h., and then went up the long ascent to Whitchurch astonishingly well—for a 66-ton locomotive—breasting the mile at 1 in 97 at 55 m.p.h., the second mile (1 in 158) at 47 and the third mile (1 in 184) at 45, after which we mounted the 3½ miles to mile-post 12 (the last 2¼ averaging 1 in 110) at a minimum of 26 m.p.h. Then followed speeds of 68 m.p.h. at Prees, 64½ at Wem, 50½ at Yorton and 64½ at Harlescott, prior to a signal check which preceded Shrewsbury. Thus, from Crewe, we passed Nantwich, 4.5 miles, in 7 min. 25 sec., Wrenbury, 8.9 miles, in 12 min. 50 sec., mile-post 12 summit in 18 min. 35 sec., Whitchurch, 13.8 miles, in 20 min. 50 sec., Prees, 18.7 miles, in

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G.W.R. PONTYPOOL ROAD—HEREFORD—SHREWSBURY.

Distance.	Engine, 4-6-0 No.	Schedule.	4936†*	2952†	4023‡	2952†	2919†	2940†	4934†	2975†
	,, Name ..		*Kinlet Hall*	*Twineham Court*	*Danish Monarch.*	*Twineham Court.*	*Saint Cuthbert.*	*Dorney Court*	*Hindlip Hall*	*Sir Ernest Palmer*
	Load (tons tare)		267	—	333	365	364	343	—	384
	,, (,, full) ..		285		350	385	385	360		405
miles.		min.	m. s.		m. s.	m. s.	m. s.	m. s.		m. s.
0·0	PONTYPOOL ROAD	0	0 00	..	0 00	0 00	0 00	0 00	..	0 00
1·6	Little Mill ..	—	2 55	..	3 00	3 00	3 05	2 55	..	3 30
4·2	Nantyderry ..	—	5 45	..	5 55	6 00	6 10	5 45	..	6 50
6·8	Penpergwm ..	—	8 05	..	8 40	8 25	9 05	8 05	..	9 35
10·5	ABERGAVENNY JC.	—	13 05	..	14 25	13 30	15 40	12 35	..	14 25
13·5	Llanvihangel ..	21	18 40	..	21 40	20 15	24 10	19 00	..	21 25
21·0	Pontrilas ..	29	25 40	..	29 10	27 55	31 40	25 45	..	29 20
24·4	St. Devereux ..	—	29 25	..	32 45	31 50	35 40	29 35	..	33 20
30·1	*Red Hill Jc.* ..	39	35 35	..	39 05	38 15	42 15	35 50	..	40 15
										sigs.
33·5	HEREFORD ..	44	40 40	..	43 55	43 05	46 45	39 50	..	45 15
33·5	Net times (min.) ..	44	¶40¾	..	44	43	46¾	39¾	..	¶44¾
	Load (tons tare)	—	267	274	282	284	299	343	372	384
	,, (,, full) ..		285	290	295	300	320	360	400	405
miles.		min.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.
0·0	HEREFORD ..	0	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
1·7	*Shelwick Jc.* ..	4½	3 55	4 25	4 05	4 15	4 35	5 00	4 15	4 10
7·5	Dinmore ..	—	10 15	11 20	11 00	10 50	11 20	12 00	11 00	10 45
10·2	Ford Bridge ..	—	13 20	14 40	14 25	14 05	14 40	15 30	14 20	14 05
12·6	Leominster ..	16	15 40	17 25	16 55	16 25	17 00	17 55	16 45	16 35
18·9	Woofferton Jc. ..	23	21 55	24 30	23 20	23 10	23 15	24 45	23 25	23 45
									sigs.	
23·5	LUDLOW ..	28	26 40	29 55	28 05	28 05	27 50	29 50	28 35	29 00
						p.w.s.				
28·1	Onibury	—	31 40	35 35	33 15	34 05	32 45	35 35	34 25	34 00
31·1	CRAVEN ARMS	37	35 05	39 40	37 00	37 40	36 30	39 20	38 05	37 40
								p.w.s.		
34·3	*Marsh Farm Jc.* ..	—	39 10	43 45	41 55	41 50	41 10	45 50	42 10	41 35
37·5	Mile-post 13½ ..	—	43 35	48 25	48 20	46 15	47 10	50 50	46 55	46 00
38·2	CHURCH STRETTON	48	44 30	49 25	49 30	47 10	48 15	52 00	47 55	46 55
										p.w.s.
41·7	Leebotwood ..	—	48 15	53 15	53 20	50 45	52 05	55 35	51 40	51 30
46·7	Condover ..	—	53 30	58 15	57 55	55 30	57 10	60 10	56 55	56 00
			sigs.	sigs.	sig. stop	sigs.	p.w.s.	sigs.		sig. stop
51·0	SHREWSBURY	65	60 30	65 35	65 25	62 20	65 00	66 25	62 20	62 35
51·0	Net times (min.)	65	59	63¾	63¼	60½	62½	63¼	62	60½

† Two-cylinder engine. ‡ Four-cylinder engine. ¶ Booked time, 45 min.
* Piloted by 4-4-0 "County" class engine Hereford–Shrewsbury.

26 min., Wem, 22.0 miles, in 29 min., Yorton, 25.5 miles, in 32¾ min., Hadnall, 28.1 miles, in 35 min. 25 sec., and mile-post 31 in 38 min. 35 sec. Despite the signal check, we stopped in Shrewsbury, 32.7 miles, in 41 min. 25 sec., instead of the 46 min. allowed ; net time was a shade under 41 min. This was a very smart run, and the crew deserved congratulation, in particular, for such a time as 11 min. 10 sec. up the steeply-rising 7.5 miles from Nantwich to mile-post 12, with a 405-ton train, weighing, with tender, nearly seven times the weight of the engine.

My acknowledgments this month are due to Messrs. W. Quinton, J. R. Hollick, H. J. J. Griffith, B. Worthington, G. J. Aston, R. W. K., M. M. Niven, C. E. W. Neat, Dennis Romero, A. J. Baker, H. Dixon Hewitt, R. A. H. Weight, W. T. Thornewell, and R.E.C., for letters, etc.

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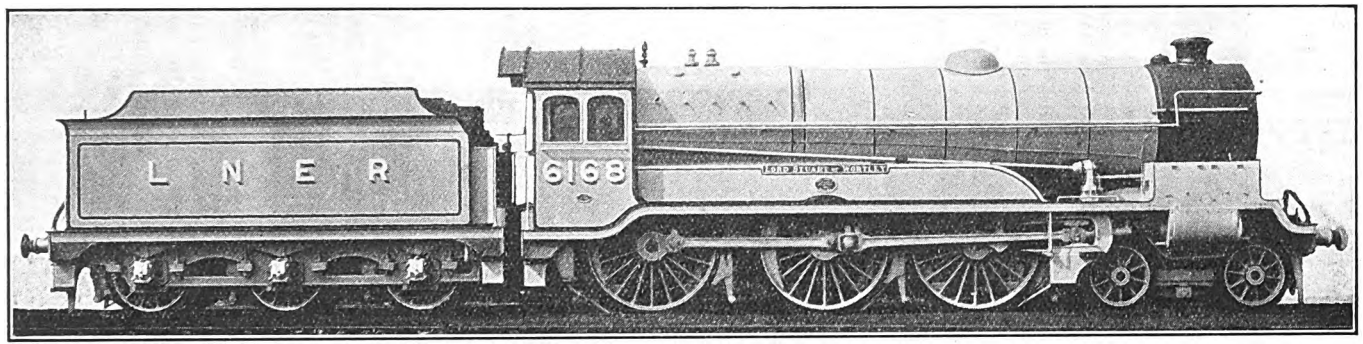
RECONSTRUCTED FOUR-CYLINDER EXPRESS LOCOMOTIVE, L.N.E.R.



Two locomotives, originally built at the Great Central Railway Company's works, Gorton, to the designs of Mr. J. G. Robinson, Chief Mechanical Engineer, and belonging to the "Lord Faringdon" class, with four single-expansion cylinders of the 4-6-0 wheel arrangement and now ranking as the B.3 class of the London and North Eastern Railway, have recently been put through a process of partial reconstruction by Mr. H. N. Gresley, the Chief Mechanical Engineer. New cylinders have been fitted and the original piston valves and Stephenson link motion replaced by poppet valves and gearing of the Caprotti type. New smoke-boxes have also been added. A slight difference in the total weight and axle loadings has resulted from the alterations made, but otherwise the main particulars remain as before.

The main particulars are as follow:—

Cylinders (four)	16 in. by 26 in.
Wheels, coupled diameter	6 ft. 9 in.
Heating surface, firebox	163 sq. ft.
,, ,, tubes (2¼ in.)	1,203 sq. ft.
,, ,, flues (5¼ in.)	678 sq. ft.
Superheater	343 sq. ft.
Total heating surface	2,387 sq. ft.
Working pressure	180 lb.
Grate area	26 sq. ft.
Weight (engine only in working order) ..	79 tons 5 cwt.

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Off the Beaten Track in South Africa.

By W. L. SPEIGHT.

NAMAQUALAND is jazzy and mysterious. One can never be sure what will come out of that part of South Africa. It is fairly well known that a railway runs from Port Nolloth to O'okiep, but until it has actually been used it is not appreciated how much of the comic opera there is about it.

The single fare from O'okiep to Port Nolloth is nearly 19s. In addition to being dated, tickets are numbered and punched, and the names of passengers specially entered in a register at the little station.

The entire railway covers about 90 miles, proving the most curious privately-owned track in South Africa. It strikes one as being but a larger brother of the boy's toy train. First-class coaches are provided for passengers, but they are so small that by extending the arms one can reach from one side to the other; with a slight acrobatic performance might even succeed in waving out of both windows simultaneously. These coaches do not hold more than four comfortably.

Passengers on this railway are asked to be at their stations more or less on time, so that the train is not kept waiting longer than necessary. It does not seem to wish to proceed until everyone is aboard. When O'okiep is left at eight o'clock in the morning, Port Nolloth is generally reached at about four o'clock that afternoon. A long wait, to enable passengers to lunch, is made at Steinkopf.

This railway, obviously, serves the purpose for which the Cape Copper Company built it admirably. It is not designed to do much in the way of passenger carrying. These diminutive locomotives are expected to draw tiny trains over the narrow-gauge line with loads of copper ingot from the mines and charcoal for them. For this work they seem to prove excellent.

At ordinary times four or five passengers are enough to set the station master wild with joy. Generally, when a deputation of this size awaits him, he is of the opinion that it wishes to purchase certain of the articles he advertises for sale. Bills, neatly written in ink and pencil, rub shoulders with the little time-tables. When there is news of any sensational discovery of diamonds, such as that at the mouth of the Orange River, a great amount of passenger traffic comes to this line. Namaqualanders from all parts hurry to the favoured district in the hope of pegging excellent claims. New discoveries of this sort also increase the ordinary traffic of the railway. It is the most reliable form of transport in this corner of South Africa, and as such is used widely.

During the two-hour halt at Steinkopf the engine of the down train is uncoupled and fixed to that up from Port Nolloth, which waits for it about twelve miles away. The gradient at this point is so steep that a train cannot be hauled up it comfortably by one of these little engines. A train, with an engine before and after, eventually arrives. One of the engines is uncoupled, while, with a snort and a whistle, the train from Port Nolloth hurries on to O'okiep.

The engine of the down train carries on for a few more miles, when it is again uncoupled, and away it steams. At the bottom of this long and steep gradient it shoots out of sight, when the native who patrols the footboards releases the brakes of the train with a twist of a wheel. Creaking and groaning, the fourteen or fifteen trucks and coaches speed down the hill under their own momentum, a thrilling downward dash, controlled by the wheel in the hands of the native.

There are many stations on this line according to the time-tables, but soon after one has started it is discovered that actually they are a considerable distance from the line. At a spot called Twelve Mile native women tumble out of the trucks on the train from Port Nolloth. Here they collect bundles of firewood for sale in that port, to which they return by the later downward train.

Railway authorities seem to fear passengers may desert during the trip, which probably explains why a native periodically strolls along the broad footboard

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running the length of the coaches. The guard occasionally indulges in similar exercise, but he seems to spend most time at the opened door of his compartment, legs dangling over the side, while he keeps an eye on his charges.

At every station where there is sufficient people a cheer is raised as the train steams in, while the tiny engine whistles shrilly and seems to rattle on with a newer interest in travel. Railways in Namaqualand are not regarded with the respect given to such institutions elsewhere. Often they are mistaken for trolley tracks and motored over with a supreme indifference to such nuisances as trains. This is a paradise of sorts for the motorist.

Walton-on-Naze Branch, L.N.E.R.

By E. N. OSBOURNE.

(*See illustrations on opposite page.*)

THIS line joins the Clacton-on-Sea branch of the L.N.E.R. (Great Eastern section) at Thorpe-le-Soken Junction, the general arrangement being that Clacton-on-Sea trains, especially those through to and from London, include vehicles for Frinton-on-Sea and Walton-on-Naze which are detached or attached at the junction. This involves a special lay-out. On the down side there is a single platform, with siding accommodation at the London end, while the turntable and engine sidings are located beyond the platform. On the up side there is an island platform, the general arrangement being that a train from Clacton-on-Sea arrives on its outer face without affecting the arrival of the Walton-on-Naze portion on the inner face. To combine the two sections, the engine which is not further required runs into a siding, while the train engine draws its portion of the train forward and backs on to the other section. An interesting feature is that towards the coast, after the various connecting crossovers are passed, the respective routes become two single lines, which parallel one another for a short distance. It is consequently possible for the Clacton-on-Sea and Walton-on-Naze portions to run into the station simultaneously side by side on what appears to be ordinary two-track.

The branch is 5¼ miles in length, the intermediate stations being Kirby Cross and Frinton-on-Sea. The Frinton-on-Sea and Walton-on-Naze section is practically on the edge of the cliffs, and for some years past considerable difficulties have been experienced owing to erosion. It has, in fact, been found necessary to reconstruct a portion of the line between Frinton-on-Sea and Walton-on-Naze farther inland, and it is with the works which have been thus involved that this article is principally concerned. About 300 yards beyond the level crossing at Frinton-on-Sea station the new line diverges inland into a shallow cutting, passing under a new road bridge into a slightly deeper cutting. It then continues on low embankment until it leads by an easy down-grade to rejoin the old line a few yards from Walton station. While the work was in progress it was necessary to complete a concrete wall at the foot of the cliffs to enable the old line to be kept in service until the new line was ready. The fourth photograph shows the temporary line laid to enable cranes to be brought down to the shore and to provide for the carriage of concrete piles, etc. The first photograph shows part of the track of the new line at the Walton end. The third illustrates a local train, worked by 2-4-2T No. 7219, on the old line leaving Walton, and the second shows the new road bridge which is being erected over the new line about half-way between Frinton and Walton. The branch is single track, Kirby Cross being the intermediate crossing station.

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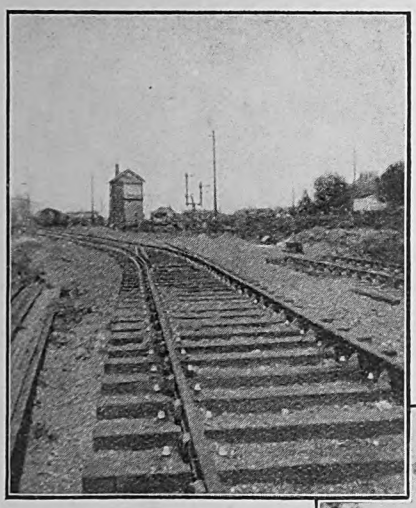
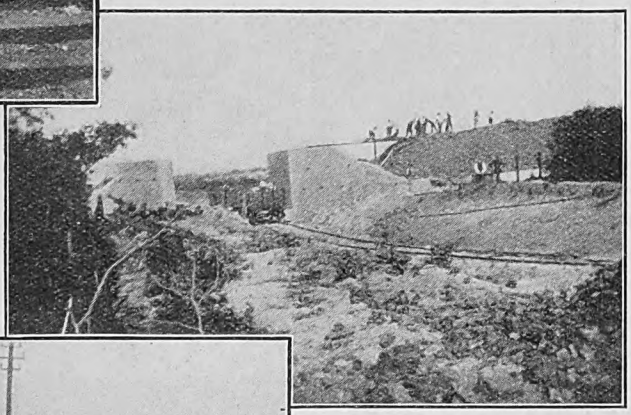
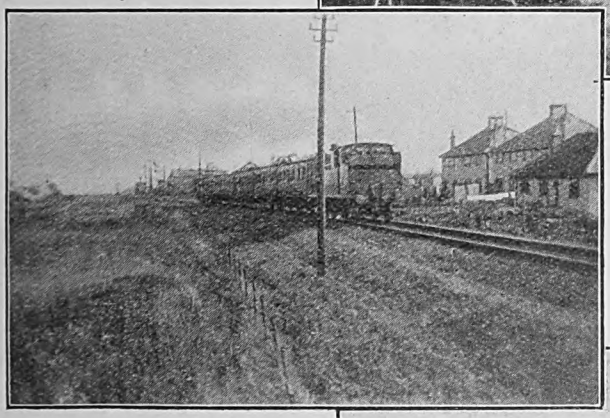
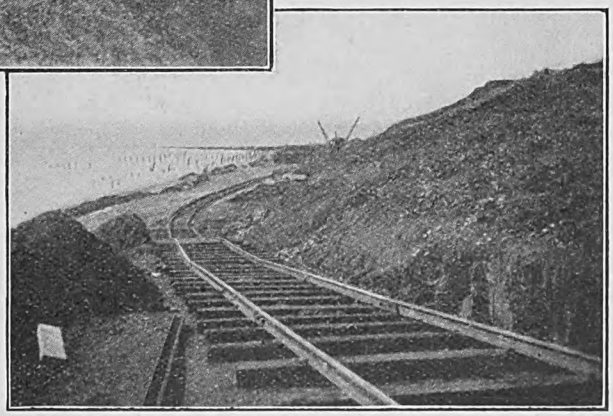


SCENES ON THE WALTON-ON-NAZE BRANCH OF THE L.N.E.R. SHOWING NEW WORKS.

(*See Article on opposite page.*)







Photos. by
E. N. Osbourne.

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SIR HAROLD HARTLEY, C.B.E., F.R.S.,

Vice-President (Works and Ancillary Undertakings) and Director of Scientific Research, London Midland & Scottish Railway.

THE board of the London Midland & Scottish Railway Company have appointed Sir Harold Hartley, C.B.E., F.R.S., to be a Vice-President in succession to the late Mr. R. W. Reid, C.B.E., and also Director of Scientific Research.

Sir Harold Hartley, C.B.E., F.R.S., appointed Vice-President (Works and Ancillary Undertakings) and Director of Scientific Research, L.M.S.R., has been a Fellow and Tutor of Balliol College, Oxford, since 1901, and is Bedford Lecturer on Physical Chemistry. During the war he took a prominent part in the direction and administration of the Gas Services in France and was Controller of the Chemical Warfare Department. He won the M.C., was thrice mentioned in despatches, and became a Brigadier-General. He was head of the Mission which reported on the German chemical factories in 1919. He is a member of the Fuel Research Board, and has served on several Government Committees dealing with the application of scientific research to various practical and industrial problems, and with the necessary organisation. Since 1922 he has been a Director of the Gas Light & Coke Company, and a member of the Works and Works Supervision Committee, and has thus been in close touch with all the recent engineering developments of that company.

Sir Harold Hartley's appointment as Vice-President in succession to the late Mr. R. W. Reid, and also Director of Scientific Research, is an interesting sign of the times and marks an innovation in railway administration. Just as the State is to have an Economic Advisory Council of experts to advise the Government on vital principles, so the largest British railway organisation is, for the first time in history, to have a guide of the highest scientific standing to co-ordinate and direct the efforts made towards improving railway transport in all phases. It will be recalled that the subject of "Scientific Research in Transport" was taken by Sir Josiah Stamp, Chairman and President, L.M.S.R., for his Presidential Address to the Institute of Transport in October last, and he then gave a lead as to future developments in his remarks that in every department and business there should be some minds set aside for considering change and improvement, and for experiment. He deplored the common waste of scientific research—"the burial of negative results in individual cemeteries with no tombstones"—and averred that between the several separate scientific fields of each kind of transport there was often not too clear and clean a contact. It is understood that the new Vice-President will exercise general supervision over the technical departments, and will also have charge of certain important developments in connection with scientific research work. The railway industry in its larger aspect is probably more complex than any other industry, and there should be abundant scope for inquiry along scientific lines as distinct from the investigations of practical men.

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60-TON TRANSFORMER TROLLEY, L.M.S.R.

The London Midland and Scottish Railway has recently put into traffic two trolleys of an entirely new type, for the conveyance of large electrical transformers. Their nominal carrying capacity is 60 tons, but the actual capacity is considerably higher. The vehicles are also suitable for carrying other heavy loads.

Transformers are slung between the girders, the weight being carried by means of brackets forming part of the transformer casing, and which rest on the top girder flange. Loading and unloading operations, in the absence of an overhead crane, are greatly facilitated by the use of a system of clutches provided and also by means of adjustable legs fitted, one to each girder.

Principal dimensions, &c., are:—

Length over buffers	62 ft. 6 in.
Centre of main bolsters	40 ft.
Bogie wheelbase	5 ft. 6 in.
Height—Rail to top of girders..	7 ft. 10¾ in. (unloaded).
Rail to top of girders..	7 ft. 9¾ in. (fully loaded).
Depth of girder at centre ..	2 ft. 4½ in.
Tare of vehicle	31 tons 10 cwt.
Load per axle under 60-ton load	11·44 tons.

The trolleys were built to the designs of Mr. E. J. H. Lemon, Carriage and Wagon Superintendent, after collaboration with the transformer makers.

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The Main Line Gradients of British Railways.

XV.—JOINT RAILWAYS.

By "VOYAGEUR."

(1) *SOMERSET AND DORSET LINE.*

THIS important route, jointly owned by the London Midland and Scottish and Southern Railways, forms the highway from the Midland Division of the former system to Bournemouth. Its chief physical characteristic is provided by the Mendip Hills, a path through which has to be found immediately the main line leaves Bath. In consequence, the gradients over the first 26½ miles, from Bath to Evercreech Junction, are exceedingly severe, with a ruling figure of 1 in 50, which exists in some considerable stretches. The maximum load of express passenger trains, therefore, is limited over this length—unless an assistant engine be provided—to 160 tons with "Class 2" and 190 tons with "Class 3" engines, which handle most of the fast trains. It is of interest to note that the 2-8-0 locomotives built at Derby for working the coal traffic of the Somerset and Dorset Line between Bath and Evercreech were considerably larger and more powerful than any engines existing, at the time of their construction, on either of the parent systems; and, so far as ordinary freight locomotives are concerned, it is probable that, apart from the Midland "Garratts," they still hold that record. Grading is considerably easier between Evercreech Junction and Blandford, the inclines, though still steep in parts, being short (save for the rise from Cole to Wincanton), but heavy gradient conditions recur from Corfe Mullen Junction to Broadstone, and on over the Southern Railway to Bournemouth West.

A considerable proportion of the Somerset and Dorset system is single line. Single track first exists from Bath Junction up the 1 in 50 gradient to milepost 2, and thence through Coombe Down Tunnel to Midford, all but 4 miles. The chief hindrance to widening here is the tunnel just mentioned, which is just over a mile long, and there is also the shorter Devonshire Tunnel on the same route. From Midford the line is double to Templecombe No. 2 Box, 36¾ miles from Bath, whence single-line working resumes to Blandford, 52¾ miles. From Blandford to Corfe Mullen Junction there are 8 miles of double line, followed by 3 miles of single line to Broadstone, whence the track is double throughout to Bournemouth. Tablet-changing on the single-line sections is carried out automatically, and as the loops are laid out for the most part with the up track straight throughout, and the curve of the turn-out on the down line only, the single line imposes but few speed restrictions on express trains from Bournemouth to Bath. There are, however, various severe restrictions at other points, especially in the coal-mining area round Radstock, and these, with the heavy gradients and the congestion occasioned by single-line traffic (especially during the busy summer season), make it necessary to provide very liberal schedules for the fast trains.

In the first ascent from Bath Junction the length of 1 in 50 totals 1½ miles, broken intermediately by ⅜-mile level and at 1 in 66 up. The grade changes at the north portal of Coombe Down Tunnel, whence there is a drop of 1½ miles at 1 in 100, steepening for a short distance to 1 in 50, down to Midford. After a sharp rise of 1½ miles from Midford, the next section, to Radstock, has steep but short undulations, and now the climb recommences in earnest. Of the next 7½ miles, to the summit at 18¼ miles (the 17¾ milepost), just short of Masbury, 3¾ miles are at between 1 in 50 and 55, and 2 miles at from 1 in 60 to 73, with short strips of easier grades or level intermediately. A shorter but more severe descent follows, the 8¼ miles from the summit to Evercreech Junction comprising 5½ miles at 1 in 50, much of which is continuous;

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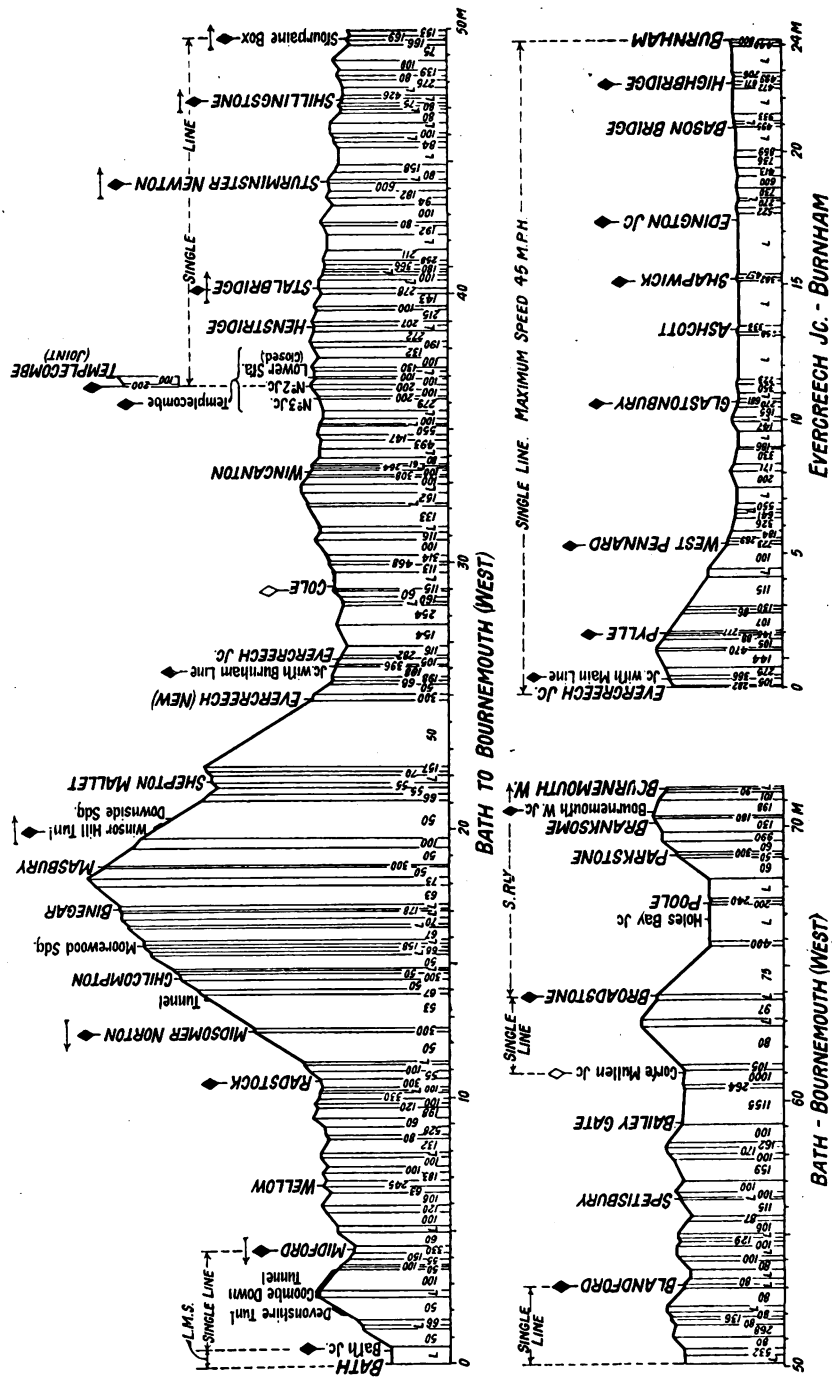

GRADIENT PROFILES—SOMERSET & DORSET JOINT RAILWAY.

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there is also, however, ¾-mile of adverse grade through Shepton Mallet, breaking up the descent. The undulations beyond Evercreech call for little remark ; they are steep in places, 1 in 80 being common, but also short. The final stage consists of the 2-mile ascent from Corfe Mullen, of which nearly 1½ miles are at 1 in 80 ; the descent at 1 in 75 from Broadstone towards Holes Bay Junction ; the climb from Poole, at 1 in 60 for 1½ miles past Parkstone ; and the final descent at 1 in 198-101 into Bournemouth West. This is, for most of its length, a hard route.

The section from Evercreech to Burnham has only been included in order conveniently to fill a vacant space, as no express trains are run over it. Gradients consist of the 5-mile Pylle bank, beginning a mile from Evercreech Junction, followed by almost dead level track from Glastonbury to the coast at Burnham, in striking contrast to the section just previously considered. A maximum speed limitation to 45 m.p.h. is in force throughout, with more severe restrictions through each passing-place on the single line.

DISTANCES.

Bath to Bournemouth (West).

Mile-posts, down side, from zero at Bath Junction to Broadstone, thence Southern Railway posts.

		Miles.
BATH		0.0
Bath Junction		0.5
Mile-post 2 (*summit*)*		2.5
Midford		4.3
Wellow		6.8
Shoscombe and Single Hill Halt		8.6
Writhlington (*down*)		9.7
Radstock		10.7
Midsomer Norton and Welton		12.5
Chilcompton, for Downside		14.5
Moorewood Siding (*up*)		15.7
Binegar		17.1
Mile-post 17¾ (*summit*)†		18.3
Masbury		18.7
Winsor Hill¶		20.1
Downside Siding		20.5
SHEPTON MALLET		21.9
Evercreech New		24.9
EVERCREECH JUNCTION		26.4
Cole		29.2
Wincanton		33.5
	Miles.	
Templecombe No. 2 (*down*)	36.7	36.7
TEMPLECOMBE	37.1	
Templecombe Lower		37.0
Henstridge		38.8
Stalbridge		40.3
Sturminster Newton		44.3
Shillingstone		47.3
Stourpaine Halt		50.2
BLANDFORD		52.8
Charlton Marshall Halt		54.5
Spetisbury		56.1
Bailey Gate		58.9
Corfe Mullen Junction (*up*)		60.7
Corfe Mullen Halt		62.0
Broadstone		63.7
Holes Bay Junction (*up*)		66.6
POOLE		67.1
Parkstone		68.9
Branksome		70.2
BOURNEMOUTH WEST		71.5

* North end of Coombe Down tunnel (no box).
† No box.
¶ Between up and down lines.

Evercreech Junction—Burnham.

	Miles.
EVERCREECH JUNCTION	0.0
Pylle	2.0
West Pennard	5.4
GLASTONBURY	10.7
Ashcott	13.4
Shapwick	15.3
EDINGTON JUNCTION	17.5
Bason Bridge	21.0
HIGHBRIDGE	22.6
BURNHAM	24.2

(2) *MIDLAND AND GREAT NORTHERN JOINT COMMITTEE.*

One of the most singular features of this important joint system, which has the longest continuous main line—112.2 miles—of any British joint railway, is that the line in question commences in the open country, 5 miles from the nearest M. & G.N. station. The beginning is by an end-on junction with a single line branch of the Midland Division of the L.M.S., at almost exactly the point where the route crosses the main line of the L.N.E.R. just north of Little Bytham Station. The single line just referred to branches southwards from the Nottingham to St. Pancras main line at Saxby, 4 miles south of Melton Mowbray. In order to complete the route followed by express trains from Birmingham to the Norfolk Coast, the profile starts at Leicester and is carried through Syston to Melton Junction, and thence to Saxby and Little Bytham Junction, where the M. & G.N. line proper begins. The M. & G.N. Joint Committee is, however, responsible for finding locomotive power for certain of these trains to and from both Leicester and Nottingham daily.

Immediately on leaving Saxby, east-

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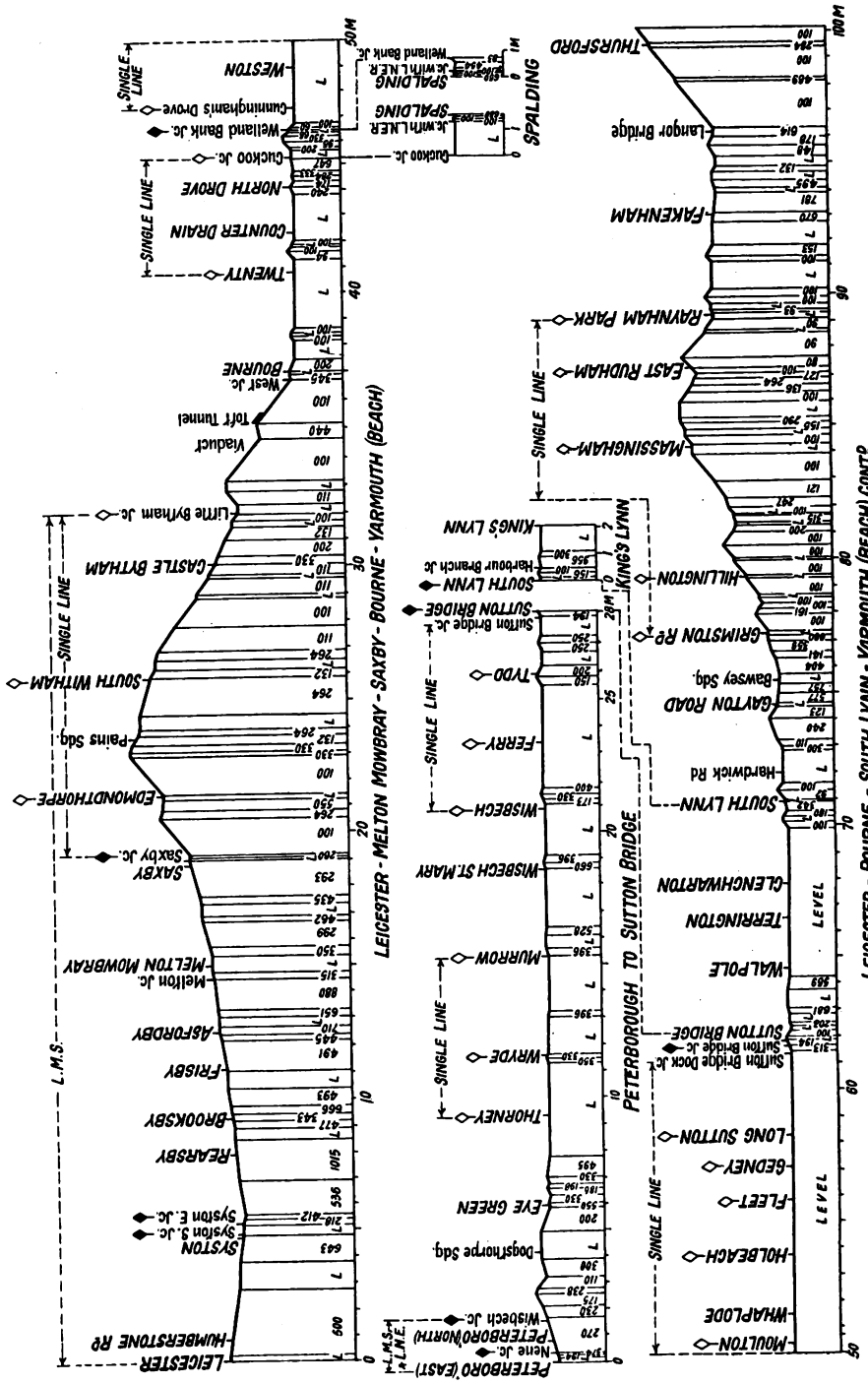

GRADIENT PROFILES—MIDLAND & GREAT NORTHERN JOINT RAILWAY (SHEET 1).

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bound trains encounter heavy gradients, the next 4 miles including 3 up at 1 in 100, ere the summit is reached near Pain's Siding. After that there is a very long descent, totalling 13¾ miles, and including 6½ miles at 1 in 100-110—broken intermediately at one or two points—ere the Fen Country is reached at Bourne. Toft Tunnel, 1¾ miles short of Bourne, is the only tunnel on the M. & G.N. system. From there onwards to South Lynn, a distance of 34 miles, the line is practically dead level throughout, as is also (apart from its first 5 miles) the connecting main line from Peterborough, which comes in at Sutton Bridge. An interesting feature of the latter is the way in which the late G.N. & G.E. joint line is crossed on the level at Murrow, near Wisbech. Of the rising grades beyond South Lynn the two worst sections are from Grimston Road to beyond Massingham, including over 4 miles at 1 in 100, and the still worse climb from Langor Bridge cabin, which is for 5 miles almost exclusively at 1 in 100. A short 1 in 100 descent then leads to Melton Constable.

All three routes from Melton Constable have very heavy grading. On the Yarmouth line there are several stiff banks from 2 to 4 miles long, with stretches of from 1½ to 2 miles at 1 in 100, but on the last 21 miles from Honing to Yarmouth the gradients are very short, the line being but little harder than level. The Norwich branch has also some lengthy grades, such as the 3 miles down from Melton Constable, the 4 miles down past Whitwell and the 3½ miles past Drayton, broken by the 2-mile ascent at 1 in 100 through Attlebridge. But much the worst grades are on the Cromer branch, with 2¾ miles falling at 1 in 80-93 from Melton Constable, 2¼ miles up at 1 in 82-100 to Holt, and 2 miles at 1 in 80 down through Weybourne. Trains for Cromer must be reversed at Melton Constable, as the junction of the Cromer branch is a trailing one, east of the station. As will be seen from the profiles, a large proportion of the M. & G.N. lines is single track, but automatic tablet-hanging arrangements are in force at the passing loops, which are well laid out, so that many of the speed reductions through passing stations are only nominal in character.

DISTANCES.

Leicester to Melton Mowbray, Bourne, Spalding, Melton Constable, and Yarmouth Beach.

M. & G.N. mile-posts, down side throughout, Bourne East Jc. (37·2 miles in table) (zero) to Sutton Bridge, Peterborough (Wisbech Jc.) (zero) to South Lynn, and South Lynn (zero) to Yarmouth.

		Miles.
LEICESTER		0.0
Humberstone Road		0.8
Syston		4.7
Syston East Junction (down)		5.2
Rearsby		7.9
Brooksby		9.3
Frisby		11.1
Asfordby		12.4
Melton Junction (down)¶		14.4
MELTON MOWBRAY*¶		15.0
Saxby		18.8
Edmondthorpe		21.3
Pain's Siding		23.6
South Witham		25.8
Castle Bytham		30.1
*Little Bytham Junction (down)**		31.9
BOURNE		37.0
Twenty		40.8
Counter Drain		42.3
North Drove		44.1
	Miles.	
Cuckoo Junction (up)	45.2	45.2
SPALDING	46.8 / 0.0	Direct
Welland Bank Junction (down)	0.6	46.5
Cunningham's Drove (up)		47.3
Weston		48.9
Moulton		50.4
Whaplode		51.5
Holbeach		53.7
Fleet		55.8
Gedney		57.1
Long Sutton		58.4
Sutton Bridge Dock Junction (up)		61.3
Sutton Bridge Junction (up)		61.6
SUTTON BRIDGE		61.8
Walpole		64.6
Terrington		66.6
Clenchwarton		67.9
	Miles	
SOUTH LYNN	70.9	70.9
KING'S LYNN	73 0	
Hardwick Road (up)		72.0
Gayton Road		74.5
Grimston Road		77.4
Hillington		79.4
Wilson's Stone Siding		81.7
Massingham		84.1
East Rudham		87.3
Raynham Park		89.2
FAKENHAM		93.0
Langor Bridge (down)		96.1
Thurlsford		99.5
MELTON CONSTABLE		102.6
Corpusty		107.6
AYLSHAM		114.2
Felmingham		117.5
NORTH WALSHAM		119.8
Honing		122.7
Stalham		126.6

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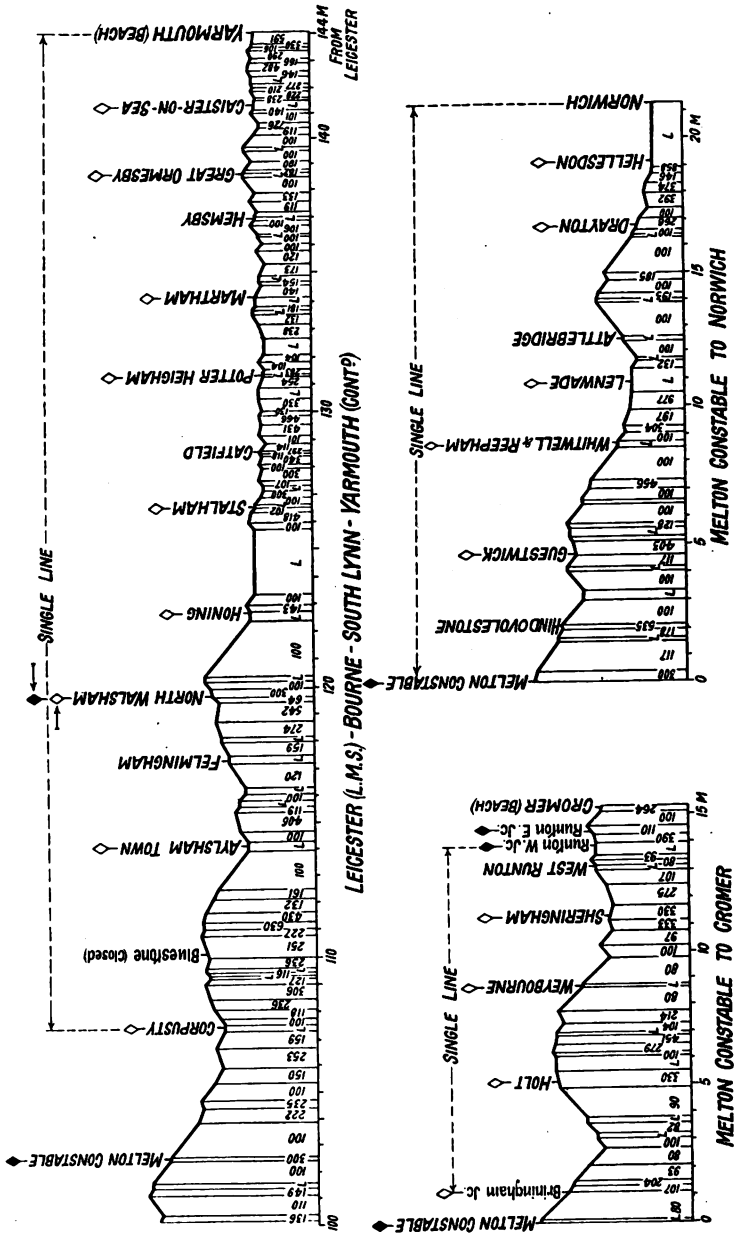

GRADIENT PROFILES, MIDLAND AND GREAT NORTHERN JOINT RAILWAY (SHEET 2).

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Catfield	128.7
Potter Heigham	131.5
Martham	134.2
Hemsby	137.0
Great Ormesby	138.7
Caister	141.5
YARMOUTH (BEACH)	144.1

* L.M.S. line from Leicester to Little Bytham Junction ; M. & G.N. line thence to Yarmouth Beach.

¶ Down trains Leicester to M. & G.N. line run over up L.M.S. main line, Melton Junction to Saxby.

Melton Constable—Cromer.

Mile-posts, down side, from zero at South Lynn.

	Miles.
MELTON CONSTABLE	0.0
Briningham Junction (down)	1.1
Holt	5.1
Weybourne	8.7
SHERINGHAM	11.4
West Runton	13.1
Runton West Junction (down)	13.8
Runton East Junction (down)	14.4
CROMER (BEACH)	15.2

Melton Constable—Norwich.

Mile-posts, down side, from zero at South Lynn.

	Miles.
MELTON CONSTABLE	0.0
Hindolvestone	2.1
Guestwick	4.6
Whitwell	8.6
Lenwade	10.9
Attlebridge	12.5
Drayton	16.8
Hellesdon	19.2
NORWICH (CITY)	21.3

Peterborough—Sutton Bridge.

Mile-posts, down side, from zero at South Lynn.

	Miles.
PETERBOROUGH (NORTH)	0.0
Wisbech Junction (down)	0.7
Dogsthorpe Sidings (down)	3.4
Eye Green	5.1
Thorney	8.5
Wryde	10.7
Murrow	14.4
Wisbech St. Mary	17.7
WISBECH	20.1
Ferry	22.6
Tydd	25.1
Sutton Bridge Junction (up)	27.2
SUTTON BRIDGE	27.4

(3) *L.M.S. AND GREAT WESTERN JOINT LINES.*

SHREWSBURY TO HEREFORD AND PONTYPOOL ROAD.

Of this section only the 51 miles from Shrewsbury to Hereford are jointly owned, but as a matter of convenience the profile is extended over the purely Great Western length of line to Pontypool Road. The "North to West" main line is an extremely important artery of traffic. It forms the chief medium of communication between Lancashire, the North-West of England, and Scotland, on the one hand, and Bristol and the West of England, *via* the Severn Tunnel, as well as South Wales, on the other. The profile throughout concerns the Great Western rather than the London Midland and Scottish Railway, as the motive power for all the North to West express trains is provided by the former Company.

The alignment of the route, through such hilly country, is excellent, and service slacks are few, being confined chiefly to those in the immediate neighbourhood of Hereford, where practically all the trains stop. But there is a certain amount of reverse curvature on the long inclines, with the result that very high speeds are seldom run, and it is customary, in particular, to keep the speed at a moderate figure on the descent from Church Stretton to Shrewsbury.

Half-a-mile out of Shrewsbury climbing begins, and against south-bound trains the $11\frac{3}{4}$ miles of this first bank is the most severe obstacle. From $2\frac{1}{4}$ to $6\frac{3}{4}$ miles it is broken by easier grades, but the next $5\frac{1}{4}$ miles are very difficult, being inclined almost exclusively at between 1 in 90 and 100. Through the magnificent scenery surrounding Church Stretton there is a short level section, and falling grades, beginning at mile-post $13\frac{1}{2}$, are then more or less continuous for the whole way to Hereford, the south-bound journey being, on the whole, the easier of the two. The worst difficulties of north-bound trains are concentrated in the $8\frac{1}{2}$ miles between $13\frac{1}{2}$ miles and the bottom of the 1 in 112 near Onibury, of which $5\frac{1}{2}$ miles are at between 1 in 100 and 113, but the ascent is broken by short down-grades near Craven Arms and Marsh Brook. After that the chief features are the miniature "summits" at Ludlow, beyond Woofferton Junction, and at the north portal of Dinmore Tunnels, through which the north-bound track is carried on a separate and flatter location than the steeply falling down-line. It may be mentioned that the generally-accepted figure of 1 in 78 for the descent from Shelwick Junction to Barr's Court Junc-

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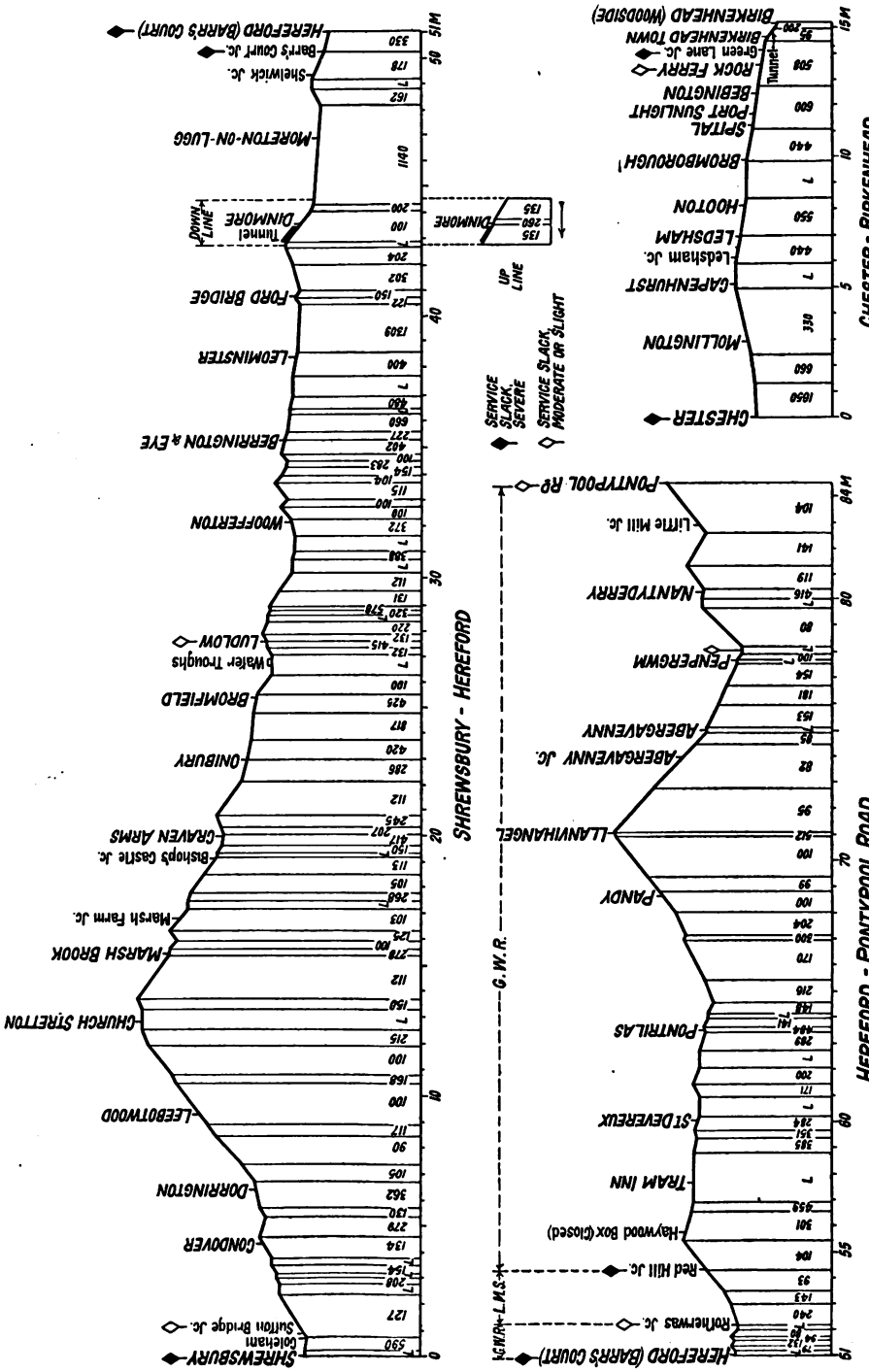

GRADIENT PROFILES, LONDON MIDLAND AND SCOTTISH AND GREAT WESTERN JOINT LINES.

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tion at Hereford is incorrect ; the gradient is actually 1 in 178.

Beyond Hereford the chief difficulty is the summit at Llanvihangel. There is first of all the steep rise out of Hereford for 3¼ miles past Red Hill Junction, and after this a level 8½ miles to just beyond Pontrilas. Then comes the 6½-mile climb to the summit, of which, however, only the final 3 miles are as steep as 1 in 95-100. But the descent from Llanvihangel to Penpergwm is the worst bank on the route, with its 4 miles at 1 in 82-95, followed by 2¾ miles mostly at 1 in 153-154 to beyond Penpergwm. The sharp, though broken, ascent from there to Pontypool Road makes a fine start for north-bound trains. It is unfortunate that a sharp curve through Penpergwm should prevent the bottom of this profound dip from being rushed at high speed. Southwards from Pontypool Road the line falls continuously for 6 miles at 1 in 95-120 to Ponthir, whence it is practically level down the Usk Valley to the Maindee Junctions at Newport ; but the profile of this section will appear with the Great Western South Wales main line. The working of express trains over this difficult course is a credit to the locomotive authorities of the Great Western, as loads up to and exceeding 400 tons in gross weight are frequently handled by unpiloted 4-6-0 locomotives on the fast bookings.

DISTANCES.

Shrewsbury—Hereford—Pontypool Road.

Mile-posts, up (west) side, Shrewsbury (zero) to Hereford, and Red Hill Jc. (from zero at Brecon Curve Jc., via Barton) to Pontypool Road.

	Miles.
SHREWSBURY	0.0
Sutton Bridge Junction (down)	0.8
Condover	4.3
Dorrington	6.4
Leebotwood	9.3
CHURCH STRETTON	12.8
Marsh Brook	15.4
Marsh Farm Junction (down)	16.7
CRAVEN ARMS	19.9
Onibury	22.9
Bromfield	25.3
LUDLOW	27.5
Woofferton Junction	32.1
Berrington and Eye	35.2
LEOMINSTER	38.4
Ford Bridge	40.8
Dinmore	43.5
Moreton-on-Lugg	46.8
Shelwick Junction (up)	49.8
Barr's Court Junction (up)	50.3
HEREFORD (BARR'S COURT)	51.0
Rotherwas Junction (down)	52.2
Red Hill Junction (down)	54.4
Tram Inn	57.7
St. Devereux	60.1
Pontrilas	63.5
Pandy	68.6
Llanvihangel	71.0
ABERGAVENNY JUNCTION	74.0
Abergavenny	75.0
Penpergwm	77.7
Nantyderry	80.3
Little Mill Junction (up)	82.9
PONTYPOOL ROAD	84.5

NOTE.—Shrewsbury to Pontypool Road is regarded as the down, and Pontypool Road–Shrewsbury as the up line.

CHESTER TO BIRKENHEAD.

Little need be said about this short route, which is used by the competing services of both L.M.S. and G.W. Companies from London to Birkenhead. A singular feature of the working, also, is that a Great Western London express may be and not infrequently is hauled by an engine of the L.M.S. Company. Gradients consist of one gentle rise from Chester to the summit at Capenhurst, with a still more gentle fall succeeding it to Birkenhead. The remaining important L.M.S. and G.W. Joint express route—from Chester to Warrington—has appeared already in August of last year, among the Western Division profiles of the L.M.S. system.

Chester—Birkenhead.

Mile-posts, down side, Chester (zero) to Birkenhead.

	Miles.
CHESTER (GENERAL)	0.0
Mollington	2.9
Capenhurst	5.1
Ledsham	6.9
HOOTON	8.1
Bromborough	9.8
Spital	11.2
Port Sunlight	11.6
Bebington	12.4
ROCK FERRY	13.5
BIRKENHEAD (TOWN)	14.7
BIRKENHEAD (WOODSIDE)	15.2

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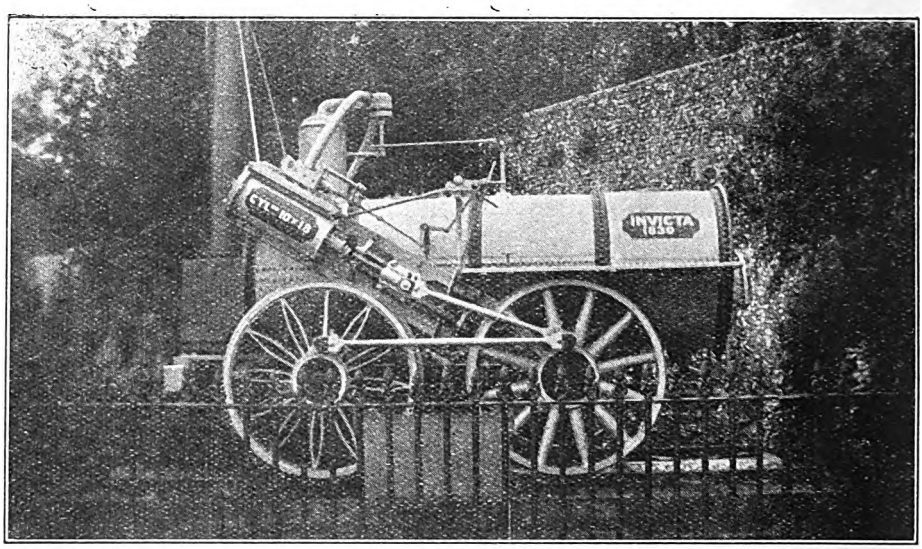

THE "INVICTA" IN DANE JON GARDENS, CANTERBURY.

The Canterbury and Whitstable Railway.

By F. G. SPINDLER.

(*Photographs by the Auther.*)

IN view of recent allusions to early railway tunnels, and to the notorious one on the above line in particular, it is thought that some mention of this early railway, which this year attains its centenary, may be of interest.

The line was publicly opened on May 4, 1830, and was the outcome of the necessity for a more expeditious transportation of goods to Canterbury from the coast, the river, which had long provided the principal means of access for such traffics, gradually ceasing to serve its useful purpose.

Throughout its length of roughly 6½ miles the line encounters some particularly sharp gradients, and includes the famous tunnel at Tyler Hill, about a mile to the north of Canterbury. The original survey, as presented by Stephenson, putting forth a route not entailing a tunnel, seems to have been rejected by the company, but whether owing to a specific desire on their part for a tunnel, it is not possible to say with any degree of certainty. A number of original copy letter books of the company at this date are preserved in the Royal Museum at Canterbury, but these contain no record of such a stipulation.

The line, which is standard gauge, and has three halts, is single throughout, the one passing-loop that originally existed being later abandoned. Traction was by means of rope haulage for the most part, the locomotive *Invicta* being engaged only for the latter part of the journey into Whitstable.

In 1846 the South Eastern Railway took over the branch, which had been practically out of use for several years, consequent upon the failure of the firm to whom it had been leased. This company took in hand several improvements, and provided their own engines to work the line throughout. After withdrawal from service *Invicta* was taken to the Ashford Works, and was later given by the directors to Sir David Salomons, who

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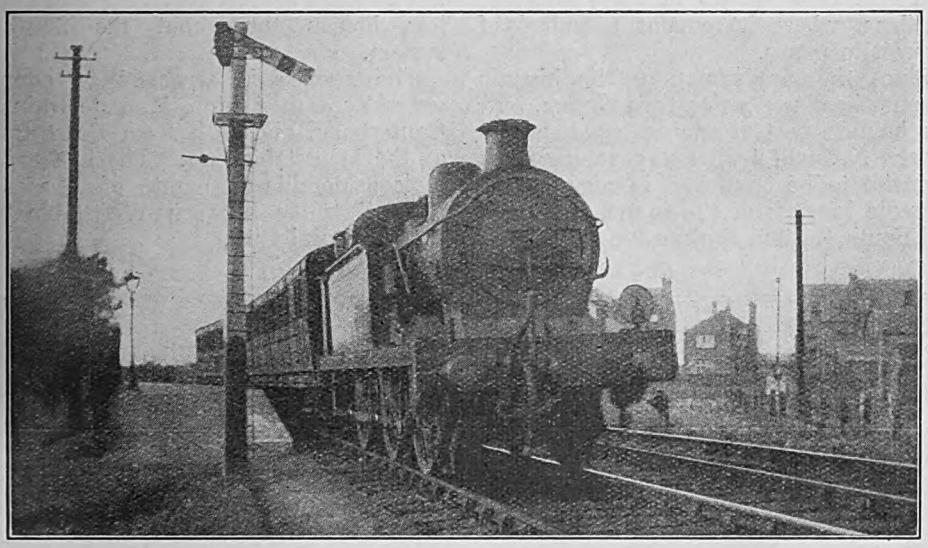
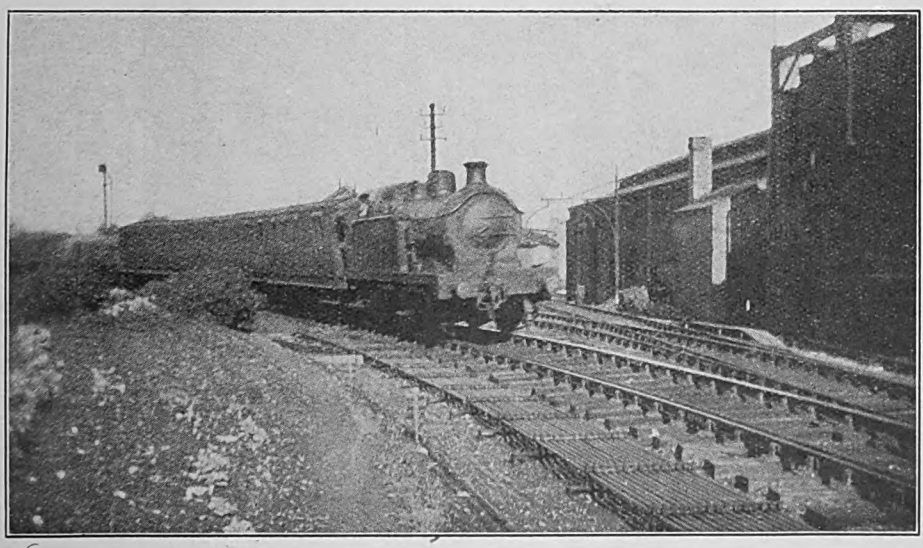


TRAIN LEAVING WHITSTABLE HARBOUR.



MIXED TRAIN APPROACHING CANTERBURY WEST.

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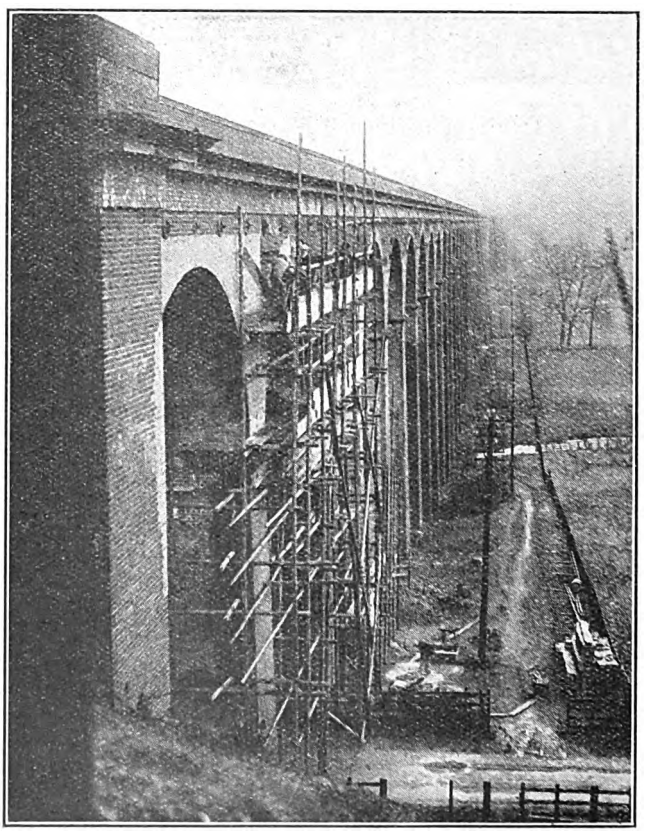
had long interested himself in its preservation. It was subsequently presented by him to the City of Canterbury in 1906, and was duly set up in the Dane Jon Gardens, where it remains a source of interest to many.

Since the amalgamations the historic line has been under Southern régime, but, for the most part, it retains its old characteristics. Small 4-wheeled coaching stock has still to be employed in view of the extreme lowness of the tunnel roof, and old South Eastern Stirling 0-6-0T engines are still to be seen at the head of the trains, some of which are "mixed"—passenger and goods. These locomotives are amongst the last surviving with domeless boilers throughout the Southern system.

The service is arranged to connect generally with Ashford-Margate trains at Canterbury, and with Kent Coast trains at the Whitstable end. The line enjoys a considerable amount of "season-ticket" traffic between Whitstable and the Cathedral City.

WELWYN VIADUCT, L.N.E.R.



[*Fox Photos.*

SCAFFOLDING ERECTED FOR REPOINTING WORK.

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Great Indian Peninsula Railway Electrification.

REFERENCE has already been made to the electrification of the G.I.P. Railway from Kalyan to Poona, the first main-line electrification in India, which was opened for public traffic on November 5.

We are now enabled to supplement our article in one or two respects, and to furnish the accompanying additional illustrations, which show, first, a steam train ascending the Ghats, and next, an electric passenger train ascending, and an electric freight train on the Ghat re-alignment.

The inauguration of this section completes electrification between Bombay and Poona, 119 miles, which is the largest phase of the company's general scheme for the electrification of its services between Bombay, Poona, and Igatpuri.

It is expected that the section between Kalyan and Igatpuri will be completed by the end of March, 1930. When this is done it is believed that the G.I.P. Railway will then have the greatest length of electrified main line in the British Empire, and the entire scheme will be one of the most important main-line electrifications in the world.

The total mileage of electrified track beyond Kalyan will be equivalent to 272 single track miles, or, together with sidings, 338 miles.

Mr. D. S. Burn, Agent of the railway, in asking Sir Frederick Sykes, Governor of Bombay, to declare the line open, enumerated some of the advantages of electrification as follows:—

(1) Freedom from smoke in the towns through which the line passes and in the tunnels.

(2) Improvement of passenger train services both as regards schedule speed and frequency of trains.

(3) Increase in carrying capacity of the line without costly additions to permanent way, owing to the haulage of heavier trains at higher speeds.

(4) Reduced cost of haulage compared with steam traction, and reduction in wear and tear to rolling-stock owing to the employment of regenerative braking.

(5) Reduced risk of locomotive failures and loss of time on locomotive account.

(6) Economy in coal consumption and the utilisation of lower grades of coal in the power house.

(7) Freedom from anxiety about failure of water supply.

Connected with the electrification scheme is that of the elimination of the Bhore Ghat reversing station. This has already resulted in a considerable saving in running time and, by making it possible to take the full train loads which can be hauled up the Ghats by the electric locomotives, it will effect a great reduction in the cost of haulage, as well as doubling the carrying capacity of this section of the line.

The problem of cutting out the reversing station and the location of the re-alignment called for the adoption of methods unusual in ordinary survey practice. There are three tunnels in all, aggregating 4,598 ft. The longest of these is 3,100 ft., built throughout on a curve of the sharpest radius which occurs in these Ghats.

Sanction for the G.I.P. main-line electrification was given by the Secretary of State for India in November, 1925, and the total amount of the original estimate, exclusive of the power house, was approximately £4,150,000, *i.e.*, about 5.55 crores of rupees. The sanction to the estimate for the Kalyan Power House, amounting to Rs. 97,40,420, was given in March, 1926, and the principal contracts were let during 1927.

Messrs. Merz & Partners were the consulting engineers, and the principal contractors included Metropolitan-Vickers, English Electric Co., Babcock & Wilcox, Ltd., C. A. Parsons & Co., Ltd., British Insulated Cables, Ltd., Westinghouse Brake & Saxby Signal Co., W. T. Henley's Telegraph Works, British Thomson-Houston Co., General Electric Co., Witton, British Brown Boveri, Ltd., Hawthorn, Leslie & Co., and the Hindustan Construction Co., Ltd., Bombay.

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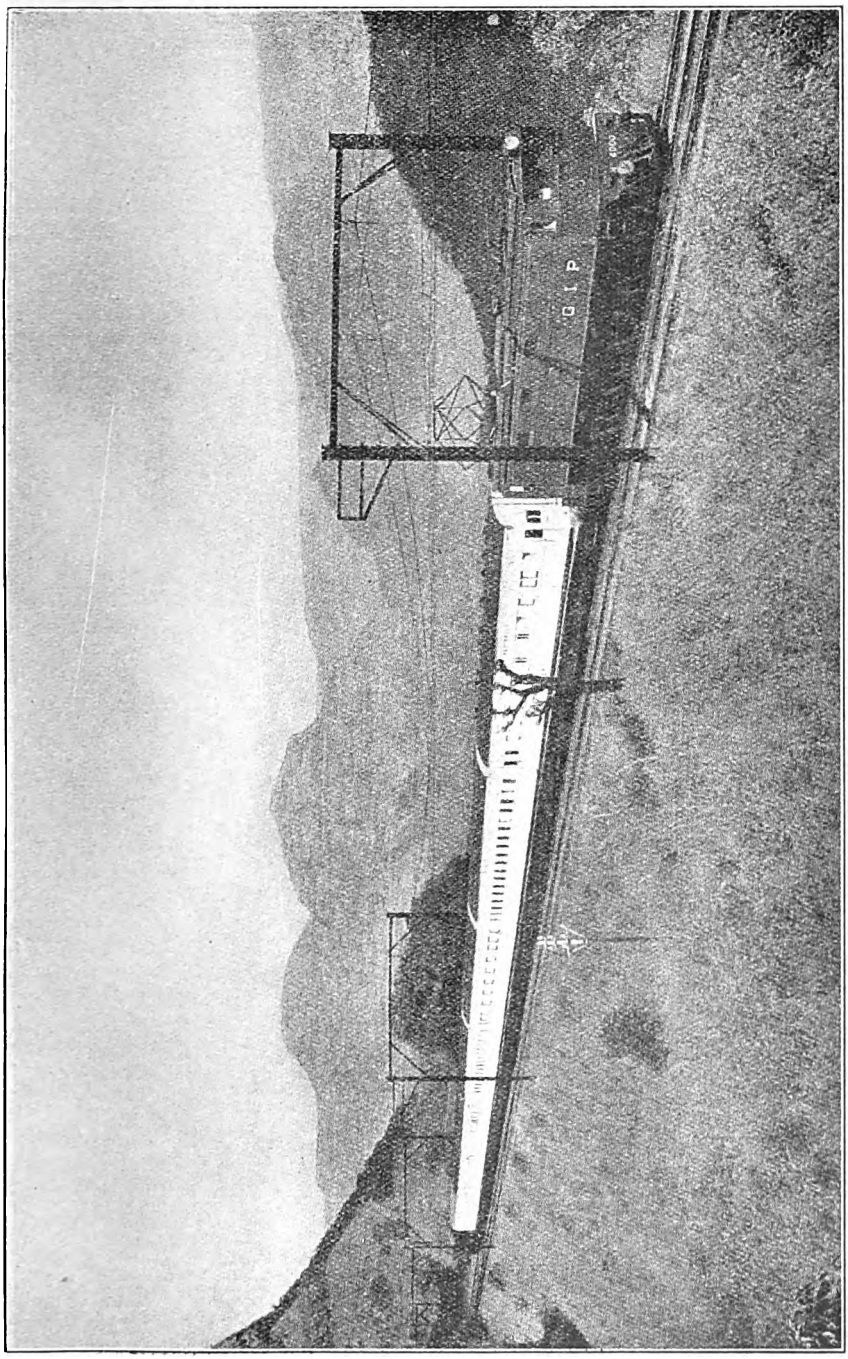

ELECTRIC PASSENGER TRAIN ASCENDING THE GHATS.

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RAILWAY MAGAZINE *readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to the dimensions and weights of railway rolling-stock and to names, numbers, dates, &c., of locomotives should not be forwarded. No reader should send more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history or "grouping," the pages of the "Railway Year Book"* (5s. *net*) *should be consulted. The thirty-second Annual Edition* (1929) *of this standard railway reference work is now published. All previous Editions are out of print.*

Portmeadow Halt, L.M.S.R.

Mr. E. Little writes: "The service was inaugurated on Monday, October 9, 1905, the rail motor car being timed to run from Oxford to Bicester in 37 minutes, calling at Port Meadow (at first named Summertown), Wolvercote, Oxford Road, Islip, Oddington, Charlton and Wendlebury. The opening day was rather under a cloud, inasmuch as the motor ran hot at the end of the return trip from Bicester in the early part of the morning, and therefore a 5-ft. 6-in. 2-4-2 tank with a corridor eight-wheeler was pressed into service, also a step-ladder to provide entry into the coach from the halts, which were only formed of sleepers at rail level. As I was living near Bicester at that time I specially arranged to make a trip to Oxford on the opening day, and thus found the improvised 'motor' as above described. When the general curtailment of services came into operation in 1917, the Oxford-Bicester rail motor service was suspended and was not restored until about 1920. Finally, in 1925, it was permanently withdrawn, as by that time it had a very powerful competitor to contend with in the way of the country motor-'bus services around Oxford, some of which touched the villages formerly catered for by the rail service. It may be remarked that the London & North-Western rail motor-cars were extremely comfortable to ride in, due, no doubt, to the fact that the engines were fitted with inside cylinders. Perhaps the weakest point was the ventilation. The passenger part of the car was not fitted with any 'let-down' windows, which produced most unpleasant closeness when travelling engine-first in hot weather. One would be interested to know if these rail motor-cars have now been scrapped."

[Further reply to "ROWINGTON JUNCTION."]

Through Trains from the North to the Southern Railway.

Mr. R. H. Dane mentions that the train in question went from Norwich to Peterborough *via* the M. and G.N. joint line, though he cannot say whether it continued to King's Cross and thence over the Metropolitan Widened Lines to the S.R., *via* Liverpool Street and the East London line, or *via* Northampton, Willesden Junction and Addison Road.

Mr. E. A. Gurney-Smith suggests the use of the new junction at Market Harborough and *via* Northampton. He also recalls that during the war he arranged for and travelled with 19 wounded Belgian soldiers in a S.E.C.R. bogie saloon from Tonbridge to Bedale, Yorkshire, a G.N.R. 4-4-2T conveying them from Cannon Street, *via* Snow Hill and the Metropolitan Widened Lines, for attachment to the 1.40 p.m. from King's Cross.

Mr. P. S. Evetts confirms that several excursions were worked from places on

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the G.N. section of the L.N.E.R. to the South Coast *via* Farringdon Street, Snow Hill, Brixton, Battersea Yard and Clapham Junction. L.N.E.R. 0-6-2T's usually worked them to Battersea Yard. An L.M.S. excursion from Bedford to Brighton was correspondingly worked.

[Further reply to "B.O.P." and "ROUNDABOUT."]

Disused Line in Nottinghamshire.

Mr. H. F. Pike writes: "The disused line was once part of the Midland line from Nottingham to Ilkeston Junction which breaks away from the Nottingham to Mansfield line just north of Basford, and after passing through Watnall (now disused) and Kimberley rejoined the main line at Bennerley Junction in the Erewash Valley. The line now terminates at Kimberley and is only used for goods traffic. In 1915 or 1916 the double line from there to Bennerley Junction was taken up and sent overseas for military use during the war, but from information received the rails were sunk when the ship was either mined or torpedoed. The current L.M.S. timetable map still shows the full line, but there is little likelihood of the line being reopened, as several bridges have since been demolished. The line was never a paying concern for passenger traffic, and even before the war only a few trains were run, as the L.M.S. have other alternative routes in this district and the G.N. (now L.N.E.) covered this line and stations served and took most of the traffic."

Mr. G. A. B. Hamilton writes: "The line in question belonged to the Midland Railway, and extended from Basford (Nottingham) to Bennerley Junction, on the main line, about ½-mile north of Ilkeston Junction Station. The junction at Bennerley faced south, to enable trains to proceed to Ilkeston. The line, which was double track, was closed for passenger traffic in January, 1917, and the section between Kimberley and Bennerley was abandoned. Over the remaining portion single track has been retained to serve goods traffic at Kimberley and Watnall Stations (the only two on the line), and also the various collieries in the neighbourhood.

[Further replies to E. O. FOX.]

Cab-in-Front Locomotives.

While there is much to be said for placing the driver's cab in the front of the engine, and in different parts of the world engines so arranged have been constructed at various periods, the arrangement is not usually practicable, in view of the tender. Water, of course, can be obtained from a tank tender placed at the chimney end of the locomotive, but coal is another problem. In fact, the only engines so arranged which we can call to mind either use oil fuel or do not require to carry very large quantities of coal, so that enough can be carried in a bunker arranged adjacent to the cab or alongside the boiler. Further, the objections to the present general arrangement are not so great as may appear on first suggestion.

[Reply to DENNIS H. BERG.]

Dynamometer Car Trials.

The apparatus on the side of the smokebox of L.N.E.R. 4-4-2 No. 2171, illustrated on page 98 of the February number, working a train with dynamometer car attached would be a connection or appliance for measuring smokebox draught, or analysing smokebox gases, or some other device in use for test purposes. We cannot go into details of engine workings, especially those which may be varied from time to time. In any case, particulars we might obtain would often be incorrect by the time a reply was published.

[Reply to CECIL M. FURST.]

S.R. Pullmans on the L.N.E.R.

For special race meetings Pullman cars from another railway are sometimes borrowed, and this may explain why S.R. Pullmans were noted on King's Cross-Newmarket specials, and the stock has, of course, to be worked through from one system to the other, before and after use. We cannot understand your friend's suggestion that he saw one of these trains worked by an L.B.S.C. locomotive on the L.N.E.R. Neither would an S.R. 4-4-0 be used over the Metropolitan Widened Lines in the case of a special through train.

[Reply to E. J. NORRIS.]

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Spoked and Solid Wheels.

With the development of heavy press work, the solid disc wheel has come into extensive use for wagons and, to some extent, for carriages, but it is only occasionally that solid wheels are used for locomotives. It is mainly, however, a question of manufacture, and, so far, English designers prefer to retain the spoked wheel for engines, one type or the other being used as convenient or as desired for vehicles.

[Reply to C. L. JAMBLIN.]

Train Oscillation.

Speaking generally, we should regard the London Tube Railway trains as running comparatively smoothly, and would attribute the lateral oscillation upon which you remark mainly to the frequent curves, the very solid roadbed and the rapid acceleration and deceleration. It must also be remembered that, the trains being so enclosed, noise and vibration are much more noticeable than they would be on open-air sections.

[Reply to DENNIS H. BERG.]

Great Northern Railway 8-ft. "Singles."

Mr. F. H. Gillford mentions that No. 1 was withdrawn in 1907, finishing her career as passenger pilot engine at Doncaster. He believes that the Peterborough engines Nos. 1003-4 worked the 5.20 a.m. newspaper train ex King's Cross until 1913 at least.

[Further reply to "72, CAMBRIDGE GARDENS."]

Skidding Wheels.

This occurs only occasionally and is not regarded as good practice. What it generally means is that the brakes have been so heavily applied that the wheels skid, and this is a weakness rather than an advantage, in that it tends to cause flats on the wheels and does not do the rails any good.

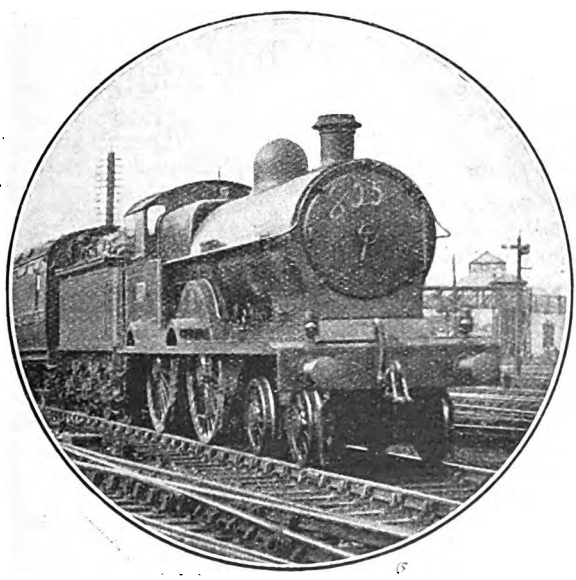
[Reply to C. L. JAMBLIN.]

Bavarian Distant Signals.

We have no information as to the colours of these signals, which, according to your sketches, consist of a disc and an arm set 90 degrees apart and turning on a common axis at 45 degrees to the post, so that the disc shows when "on" and the arm when "off." Possibly one of our readers can explain.

[Reply to B.M./R.R.R.]

DERBY-CREWE TRAIN, L.M.S.R.



L.N.W. 4-4-0 No. 5231. "GANYMEDE."

Photo.] [*T. G. Hepburn.*

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The Scottish Locomotives of the L.M.S.R.

By "INDICATOR."

In addition to correspondence considered last month, several other letters dealing with this article, included in the January and February numbers, call for attention, though for the most part they supplement information given; cover minor corrections; or argue as to points which were not considered in detail. Mr. H. C. Casserley points out that L.M.S. No. 14277 is not old No. 67 *Cromartie,* but old H.R. No. 70A, the first of the Skye bogies, built in 1882. Confusion is, however, due to the fact that years ago No. 67 and No. 70A exchanged numbers. Consequently No. 70A, as *Cromartie,* was scrapped, but No. 67 remained in service. Mr. S. T. T. Geary deals with the same matter as follows:—"This is a very prevalent mistake, and due, no doubt, to the method adopted by the L.M.S.R. in enumerating these 4-4-0's, supplemented by the complications introduced by the old H.R. system of duplication—denoted by suffixing the letter "A." L.M.S. 14277 is one of the Skye bogie "L" class, and not one of the 60-69 class of Dübs engines built in 1874, as *Cromartie* was. In 1922 No. 67 was the sole survivor of its class, and 70A was the only Class L duplicate. Upon amalgamation, it was decided to withdraw all "A" engines, and the majority were dumped at Culloden and advertised for sale. It was then decided that 70A was fit for traffic and that 67 should be withdrawn. Thereupon the numbers were interchanged. It is interesting to note that *Cromartie* never ran as 70A, and the number 67 was carried by the Skye bogie for only a limited time before it became L.M.S. 14277."

Mr. Geary adds:—"This is not the only example of numbers being interchanged on the old Highland Railway; in fact, the system of enumeration was by no means a simple one. In my opinion, the queerest anomaly in the renumbering of Highland locomotives is 14278—a 6 ft. 3 in. engine, built by the Clyde Locomotive Company in 1886—sandwiched in with the 5 ft. 3 in. Skye bogies built by the Highland Railway Company themselves at Inverness. It would seem that even official circles have been misled by the interchange of Nos. 67 and 70A, into assuming that 14277 and 14278 were sole survivors of their particular batches."

Another reader points out that No. 14277 still carries the date plate "Lochgorn Works, 1882" (where No. 70 was built), and the number is stamped on the motion. He adds: "No. 14278 (old No. 82A *Durn*) is the only survivor of its class, and was probably numbered among the Skye bogies because it thus agreed with the order of building."

A. O. L. also sends some interesting comments:—"As the reader will have noticed from perusal of the detailed list of renumbering of Highland locomotives in the January number, the original Skye line locomotives of the old Highland Railway are little more than a memory, only No. 34 being still in existence. No. 48, the latest of the class, and a former Royal engine, has already gone. The Skye line trains are now almost exclusively worked by the 4-6-0 goods engines Nos. 17950 and upwards (Highland Railway, Nos. 75 and upwards), built during the war. An occasional 'Loch' or small 'Ben' is to be seen, but the change is reflected in the much heavier and more punctual trains. The 4-6-0's have been seen with as many as eleven coaches, and thirty wagons on a goods train. They have also occasionally been seen piloted—a very rare occurrence on this line of sharp curves and steep gradients. A curious feature is that these engines of the 17950 class, though goods engines, classed apparently 4F, are some of them painted in the standard passenger colours—black, with red lining."

Mr. W. E. C. Watkinson adopts a more critical attitude, though it may be pointed out that there was no intention to go deeply into dimensional details, and the particulars given (revised officially) were for general information only. However, we give his main points for completeness and correctness as follow:—

H.R., "Loch" Class. Coupled wheels, 6 ft. 3 in.; weight of engine and tender, 85 tons 18 cwts.

H.R., Large Bens. 180 lbs. steam pressure; heating surface, 1,648.2 sq. ft.

H.R., 73 and 74. Coupled wheels, 6 ft.; steam pressure, 160 lbs.; heating surface, 1,320 sq. ft.

H.R., Drummond 140 Class. Steam pressure, 180 lbs.; weight of engine and tender, 96 tons 19 cwts.

H.R., 75 Class. Cylinders 20¼ × 26 in.; steam pressure, 160 lbs.

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H.R., 49 *Class*. Steam pressure, 170 lbs. Some of these are quite minor differences ; others may vary according to the method of reckoning or according to individual design, but as Mr. Watkinson is " almost certain they are " correct we pass them on.

Mr. F. Turner, in sending a record of his observations when making his first trip on the Highland section, mentions that several " small Bens " have received plates, " Kilmarnock, 1927." Local goods between Forres and Keith appear to be worked by 0-6-4T's. A Midland type 0-6-0T was working the Burghead branch. Caledonian 0-4-4T No. 15215 was working the Aberfeldy branch. L.M.S. 2-6-0's and 0-6-0's were seen, mostly on goods trains.

Mr. H. Piffard points out that the reference on page 20 of the January number to C.R. 4-4-0's Nos. 14502 and 14803 should obviously be 14502 and 14503. This is, of course, a printers' error. With regard to the photograph on page 33 of H.R. 4-6-0 No. 17927, he points out that these engines as they come into St. Rollox for repairs are sometimes fitted with a Caledonian " Drummond " type chimney, but are not fitted with Caledonian boilers as suggested. He also thinks that it is incorrect to refer to the " 14756 " class as the " River " class. These engines were to have been named after rivers, and he believes that one was actually painted in Highland colours and named *River Ness*, but they all went into traffic in Caledonian blue and did not carry names in service. He contends that the term " ' River ' class " should not be used, and it is better to describe the engines as the " 938 " class. He adds: " A number of the Highland section ' Loch ' class engines have been fitted with Caledonian boilers and cast-iron chimneys of the ' Pickersgill ' type in place of the original Highland pattern with louvres. As mentioned on page 22, a number of ' Small Bens ' are being rebuilt with Caledonian boilers. They are also getting new frames and cylinders, and so should be good for a long time yet."

Mr. T. Davidson mentions that C.R. 4-4-0 No. 147 is now No. 14356, not 14346 as stated. " It works trains fairly regularly to Crieff and the North, and it may be of interest that it has a peculiarly deep whistle, unlike any other Caley engine, and which, if I am not mistaken, originally belonged to 4-6-0 No. 14752 (903 *Cardean* in pre-grouping days). ' Indicator ' mentions 4-6-0's Nos. 14650-5 in Power Class 4, built by Mr. Pickersgill. What of Nos. 14647-9 in the same class, which I have seen occasionally, 14647 at Abington on a goods train, and the other two on passenger trains to the North? Were they added to the ' 60 ' class after the amalgamation came into force? " [We understand that these engines were built later.—Ed., " R.M."]

Mr. G. D. Buchanan points out that No. 14346 was previously C.R. No. 902, while No. 14356 was C.R. No. 147. Also that Nos. 15155-6-7-8 should be 167-8-9, 170. No. 14503, not No. 14803, is illustrated on page 20.

Further Scottish Notes.

" Scott Reid " mentions, in reference to Mr. J. R. Sherriff's notes in the January number that, besides old Caledonian 4-4-0T No. 1 (15024), No. 15026 of the same class is also stationed at Perth. He refers to an interesting instance in which the L.N.E.R. helped the L.M.S.R. out of a difficulty at Aberdeen on a recent Sunday. Owing to a slight mishap at the L.M.S. engine sheds in the morning, no engine could be got out in time to work the 10 a.m. excursion train to Glasgow. The L.N.E.R. therefore lent No. 9423 *Quentin Durward*, and men, who worked the L.M.S. train to Perth, whence an L.M.S. engine took the train on. The L.N.E. engine returned " light " to Aberdeen. " Scott Reid " adds some further remarks in regard to the interest of Perth (North) shed, which accommodates, besides the usual Highland classes, the " River " class 4-6-0's referred to above, which are divided between Perth and Inverness sheds, and Nos. 13100-13109 of the new L.M.S. 2-6-0 class, which engines have now been fitted with tablet-exchanging apparatus. There are also some of the standard 0-6-0 goods engines. He mentions also that recently, presumably as test runs, " Royal Scot " engines worked through from Crewe to Perth and back. This occurred at the end of the summer service period, the trains concerned being the 7.20 p.m. ex Euston, as from Crewe, and the 9.5 p.m. from Perth to the South. The engines which thus came to Perth were Nos. 6121, 6126, 6119, 6148, 6149 and 6134.

Mr. C. M. Furst sends some interesting notes on Scottish locomotive matters, including supplements to and corrections of Mr. J. R. Sherriff's remarks. He revives the story that, on the Lauder Light Railway, in snow and with the engine short of steam, the passengers had to get out and push. He also mentions that a friend of his, who travelled to Edinburgh and back daily (60 miles) was at times the only passenger on the early morning train and sometimes travelled on the engine from Lauder to Fountainhall " for company."

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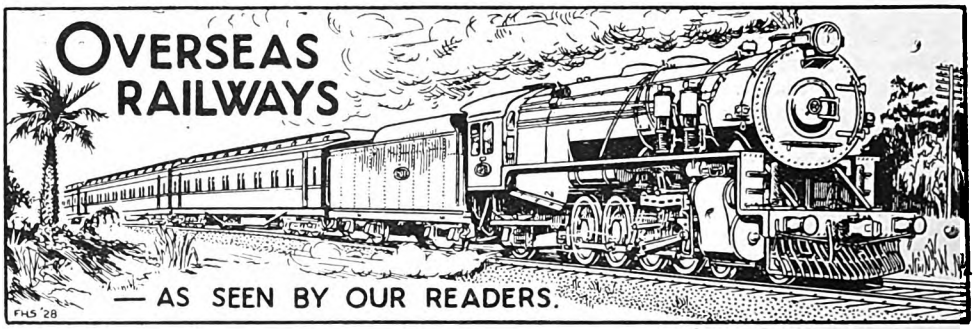

Correspondence for this section, with or without photographs, is invited.

French Railway Electrification.

Mr. R. Happé, writing from Cambrai, sends some notes as to the progress of electrification on French railways. He points out that before the war the P.O. and State Railways had only short suburban electric routes in the vicinity of Paris, those from the Quai d'Orsay station to Juvisy (about 14½ miles) and from the Invalides station to Versailles (about 10½ miles). These operated at 650 volts D.C., utilising third-rail supply. After the war it was decided that the standard for all French railways should be 1,500 volts D.C., and the Midi, P.O. and P.L.M. have since electrified various sections, while the State has proceeded with the electrification of further Paris suburban lines, though continuing to use 650 volts because of installations well advanced in 1914.

It is on the Midi that electrification has been principally developed so far, in view of the sources of water power provided by the Pyrenees. The following routes are now operated electrically:—(1) Bordeaux-Dax - Bayonne - Biarritz - Hendaye - Irun (Spain), forming part of the main line between Paris and Madrid, about 147 miles; (2) Dax-Pau-Toulouse, with branch lines to Pierrefitte-Bagueres and Luchon, about 260 miles; (3) the two trans-Pyrenean lines, Toulouse-Aix les Thermes-Puigcerda (Spain) and Pau-Canfranc (Spain), 155 miles. In the near future electrification will also be applied to the Beziers-Neussargues section, about 173 miles. Hydro-electric power stations are located at Soulom, Eget, Artouste, Miegebat and Hourat. Current is generated at 10,000 volts, three-phase, 50 periods, and is first transformed to 150,000 volts, three-phase, for transmission by overhead lines extending to Bordeaux, Dax and Toulouse. Current is then reduced to 60,000 volts for feeding the sub-stations, whence it is distributed through overhead conductors to the trains. Sub-stations are usually located about 25 kilometres apart. 4-6-4 electric locomotives are used for the express trains, other designs being provided for freight and local services. Electric motor-cars, with or without trailers, are used on some of the branch lines.

Permanent Way in Germany.

In view of the recent article on the subject of British permanent way, it may be of interest to your readers to hear some thing of recent permanent-way developments in Germany. Steel sleepers have long been standard on the German State Railways, and all lines, down to the most unimportant branch, are fitted with them. The rails are securely bolted directly on to the sleepers, forming a double track, which does not require much attention. Recently, however, it was thought worth while to reintroduce wooden sleepers on certain more important lines, the iron ones not being considered conducive to the quietness in running which is considered so desirable nowadays.

The standard rail-length on express lines was 15 metres. A year's trial of exceptionally long rails in the Rhine valley proved, however, so satisfactory, that wherever relaying is carried out now on express lines, long rails are used. The rails on the trial section were composed of two 30-metre lengths welded together on the spot, making the rail of the astonishing total length of 60 metres (195 ft.). It was afterwards found that 30-metre rails answered the purpose quite as well, and these are the rails used at present. It should be mentioned that on curves the 15-metre lengths are retained.

In the case of wooden sleepers, a form of metal chair is used which grips the rails by the flat bottom, not at the "waist," as in England. This makes it possible to make use at rail joints of a very long chair mounted on a double-width sleeper and extending nearly the whole length of the fishplate, resulting in a very effectual

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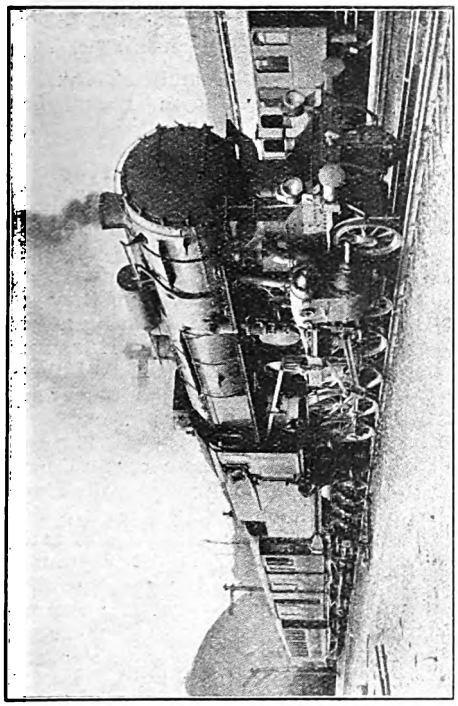
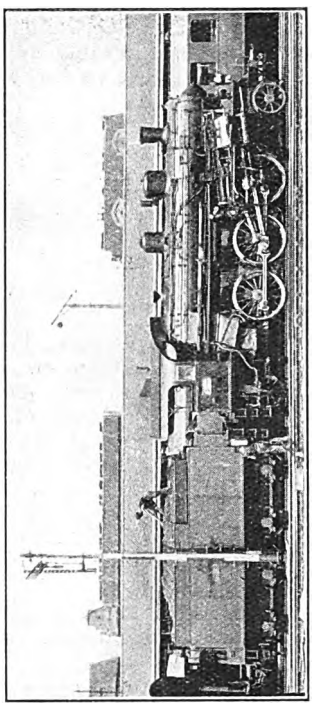
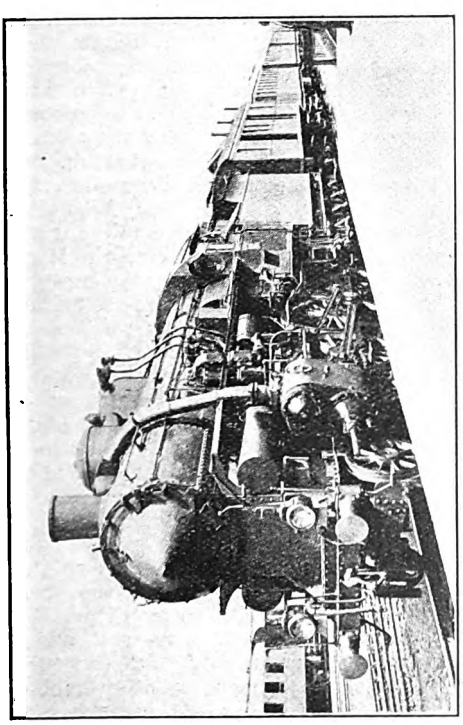


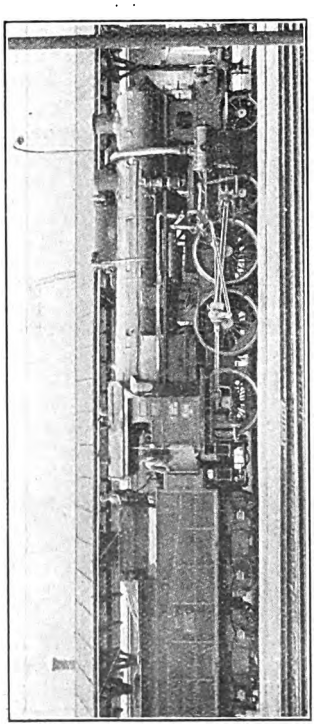
VIENNA-PARIS EXPRESS LEAVING BUDAPEST
4-8-0 No. 424.010.



LARGE 2-6-2 No. 322.032.



HAMBURG EXPRESS AT BUDAPEST.
Standard 4-6-0 No. 328.003.



STANDARD 4-6-0 No. 328.043.

SCENES ON HUNGARIAN RAILWAYS. *(Photos. by P. Ransome-Wallis.)*

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support against the pounding which the rail receives at the joint. The running over this form of track is remarkably steady and quiet, a striking contrast to the old rails fitted with iron sleepers.

In conclusion, I might say that the general appearance of the track, signals, &c., is very good, better than any other Continental railways that I have seen.

[J. C. KERR.]

"Coloured" Trains in U.S.A. and Canada.

THE passenger cars of the majority of U.S.A. railroads are painted green, and the following are a few examples:—Atchison, Topeka & Santa Fe, Chicago & North Western, Chicago, Burlington & Quincy (Burlington), Chicago Rock Island & Pacific (Rock Island), Delaware, Lackawanna & Western (Lackawanna), Illinois Central, New York Central, Reading, Union Pacific and Southern Pacific. Also the Canadian National Railways.

The Chicago & Alton, Pennsylvania, and also the Canadian Pacific colour is dark maroon.

The Chicago & North Western colour was originally yellow, and some cars still appear in that livery, but the present standard is now green—either on the score of economy or to conform with the colours of two of the principal feeder systems—the Union Pacific and the Southern Pacific. The Wabash Railway colours are royal blue.

The Michigan Central standard colours are, or were, brown and yellow-ochre, but I believe the standard green of the parent system—the New York Central—is now being adopted.

The Canadian National and Canadian Pacific own and operate their own Sleeping and Parlor Cars, which are naturally painted in the respective colours of the line concerned. As a general rule, the Sleeping and Parlor Cars on the U.S.A. systems are owned by the Pullman Company, but are painted in accordance with the standards of the individual line over which they are intended to operate. Thus, the Pennsylvania's "Broadway Limited" (New York-Chicago) and the Chicago & Alton's "Alton Limited" (Chicago-St. Louis) are composed of cars painted in the customary dark maroon; the Chicago & North Western-Union Pacific-Southern Pacific's "Overland Limited" (Chicago-San Francisco) and the New York Central's "Twentieth Century Limited" (New York-Chicago) are in the customary green; and the Wabash "Banner Blue Limited" (Chicago-St. Louis) in the customary royal blue.

The "Broadway Limited," "Twentieth Century Limited" and "Overland Limited" are All-Pullman Extra Fare trains.—[N.R.P.B.]

Notes on Hungarian Locomotives.

THE Royal Hungarian State Railways can be said, I think, to boast of the ugliest stud of locomotives in Europe, if not in the world. Despite this, all the engines seem to be remarkably efficient, and they are clean and well maintained. During a fortnight's careful study of the Hungarian locomotives—chiefly at Budapest—I never heard a single big-end knock and never saw a really dirty engine. The chief classes of passenger locomotives are: (1) The old 4-4-0's of series 220. These engines have outside link motion, and, despite their age, are often to be seen piloting express trains. (2) The standard 2-cylinder 4-6-0's of series 328. These engines are most extremely ugly, but seem remarkably good engines and perform the majority of the second-class express train work, as well as some of the first-class expresses of lighter formation. They are fitted with water-tube fireboxes, and some have spark-arresting chimneys. (3) The 4-cylinder compound 4-6-2's of series 301. A good photograph of one of these engines appeared in THE RAILWAY MAGAZINE a short time ago, so it is not necessary to illustrate this class again here. These engines are probably the "beauties" of the Hungarian railways, and can at least claim to have some pretence of lines. They take their turns on the regular first-class express work, but are, apparently, few in number, as they are not frequently seen. (4) The 2-cylinder 4-8-0's of series 424. These engines are the latest and largest express engines in Hungary, and are to be found working most of the heavy main-line express trains. They have two large outside cylinders, and driving wheels in the region of 5 ft. So wide is the firebox that the foundation ring and ashpan are *above* the two rear pairs of coupled wheels, necessitating a very high-pitched boiler, and making the engines look rather top-heavy. I never had a chance to study the performance of these machines, but one would, I think, be safe in assuming that they roll considerably as a natural consequence of large outside cylinders and the high-pitched boiler, and despite the long fixed wheelbase. They seem to handle huge trains with ease, and get away quickly and remarkably quietly. (5) For intermediate passenger work there are two series of 2-6-2 locomotives. Those of series 322 work on the same duties

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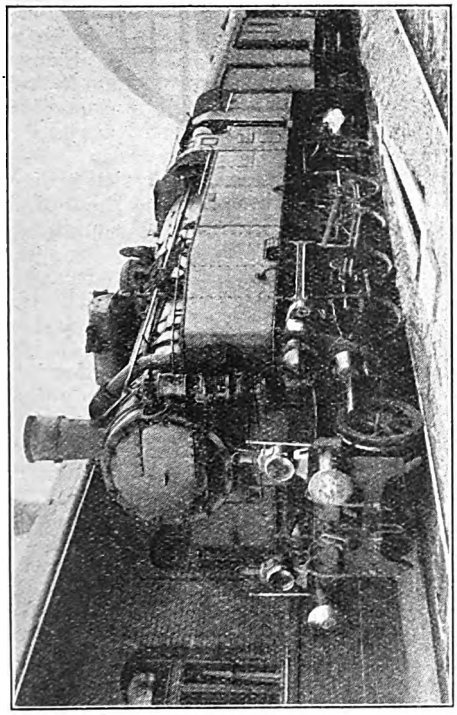

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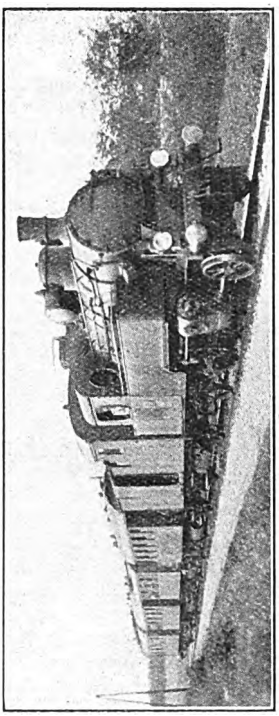
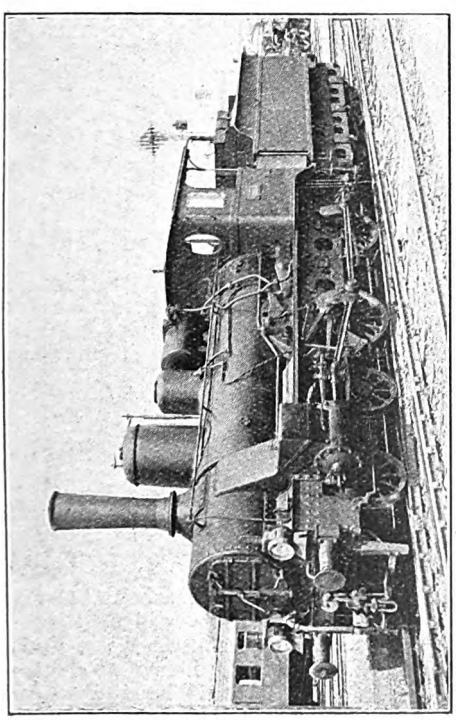
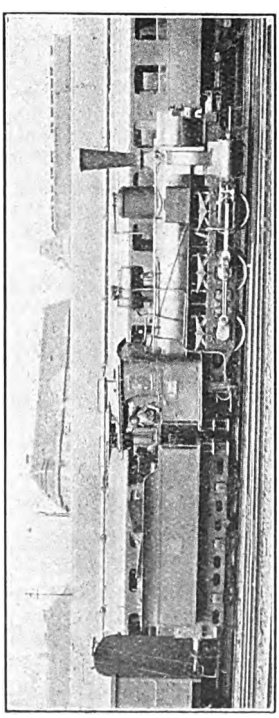


2-6-2T No. 375.572 ON LOCAL TRAIN.



OLD 4-4-0 No. 220.104.



OLD 0-6-0 No. 325.323.

HUNGARIAN LOCOMOTIVES. (*Photos by P. Ransoms-Wallis.*)

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as those with the small coupled wheels. The 4-6-0's of series 327 are used on semi-fast trains. Those of series 324 would, in this country, be classed as freight engines. In Hungary, however, they work chiefly on short-distance trains, and I saw one take out 37 large four-wheeled coaches packed to overflowing with peasant humanity. (6) For fast suburban work large 2-8-2 tank engines are used, while for service in the country there is a very useful class of 2-6-2 tank. Nearly every engine in Hungary is fitted with a "Titan" feed-water heater and purifier. This may be cylindrical in form, and placed on top of the boiler, or may take the form of an extra dome. Two interesting things are evident on Hungarian locomotives: (*a*) The comparative absence of compound locomotives; and (*b*) the bad quality of coal burnt—dust, briquettes, and wood is the usual mixture. In England we have good-quality coal and very little compounding. In France there is bad coal, but compound engines are the rule. In Hungary, superlatively bad fuel, simple engines and heavy trains, and yet there is plenty of steam, plenty of power and good, fast running. Surely this is a high tribute to the engineers who have met the conditions so well.

The "Pacific" locomotives of series 301 were first built in 1911, two as four-cylinder compounds and two as four-cylinder simples. The latter proved the more economical engines to maintain, and so twenty more were built. Nearly all these engines, with the exception of the original two compounds, have now been handed over to Roumania. Of post-war engines, by far the most numerous are the 4-6-0 two-cylinder simples of series 328 (illustrated). These engines have Brotan fireboxes, and the boiler is pitched very high in order that the wide firebox can overspread the trailing coupled wheels. These engines, in company with nearly all classes on the Hungarian railways, are fitted with the Knorr feed water pump and heater and with Pecz-Rejtö water purifiers. There are nearly 200 engines of class 328, 100 of which were built by Henschel & Co., of Cassel, and the rest at Budapest. They have cylinders of 570 × 650 mm., wheels 1.8 metres diameter. For mixed traffic work "Prairie" locomotives are in great vogue. Some of these engines are fitted with ordinary boilers, but many have Brotan boilers, like the express engines. One class of 2-6-2 is illustrated.

For suburban and branch-line work 2-6-2 tanks and 2-8-2 tanks are chiefly used. The engines of the 2-6-2T type were found insufficient to deal with the heavy suburban traffic around Budapest, and so were relegated to the country lines, being replaced by the heavy "Mikado" tanks, with Brotan boilers (both classes illustrated). The latest passenger engines constructed are of the 4-8-0 design, and are two-cylinder simples, fitted with ordinary, but very wide, fireboxes and high-pitched boilers. They have Schmidt superheaters, and the usual array of feed water pumps, heaters and purifiers. The rear coupled axle has a side play of 30 mm. The cylinders are 600 mm. × 660 mm., and the coupled wheels 1.6 metres in diameter. Thus the engines are best suited for heavy main-line expresses over heavily-graded roads, but not maintaining too high a schedule speed. For heavy goods traffic "Mallet" locomotives of 2-6-0—0-6-0, 2-4-0—0-4-0 and 0-6-0—0-6-0 types were built in 1914, but these engines are now nearly all operating in Jugo-Slavia. The engines of the 2-6-0—0-6-0 type have a tractive effort of 19 tons at 60 per cent. B.P., and have what were in 1914 the largest Brotan boilers ever constructed.—[P. RANSOME-WALLIS.]

American Railway Observations.

COMMENTING upon our recent articles on "American Locomotive Performance," Mr. Donald B. Beeson, New York City, sends the following remarks:—

"The speed of the fast freight trains that operate on a schedule as regular as the passenger trains do is very high, considering the heavy loads. I chanced to see one that had left the rails at seventy-one an hour, with one hundred and twenty-five cars in tow, on the New York-Philadelphia passenger track of the Pennsylvania R.R. Something had thrown one of the cars off, and it had put a kink of no mean dimension in the one hundred and twenty pound rail. Repassing the spot four and a-half hours later everything was again in shape, and only the lights of the men fixing the ballast indicated the place of the derailment, which seems to me to be pretty fast work."

South African Railway Notes.

MR. J. P. BRIERLEY sends the following interesting notes:—

"Probably you are aware that two of the new Beyer Peacock 'Garratt' locomotives have been delivered to the South African Railways this year, and are intended for working heavy goods traffic from Durban, on the Johannesburg main line, up the steep gradients and along the many curves of the line as far as Pieter-

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maritzburg, where the electrified portion of the line as far as Glencoe Junction begins. There are two of these monster locomotives, numbered 2350 and 2351, and known as Class 'G.L.' At the time of writing only 2350 is in service, the second engine being still in process of assembly in the Durban shops. They are of the 4-8-2 + 2-8-4 wheel arrangement, and are capable of developing a maximum tractive effort of approximately 71,660 lb., being the largest and most powerful locomotives, not only in South Africa, but in the world outside the United States of America.

"They are, of course, for the 3 ft. 6 in. gauge, and have coupled wheels of 4 ft. diameter, cylinders 22 in. diameter by 26-in. stroke, a boiler pressure of 200 lb. per sq. in., a total heating surface of approximately 4,163 sq. ft., and a total weight in working order of approximately 214 tons. I understand that the trials of No. 2350 have proved very satisfactory, the engine having exceeded all expectations in its trial runs. This is a particularly gratifying tribute to British locomotive construction, because it is well known that certain German-built engines of the 2-8-2 + 2-8-2 type have not proved as satisfactory as expected.

"The following list of the 3 ft. 6 in. gauge locomotives may be of interest:—

Class.	Date placed in Service.	No. of Engines.	Wheel Arrangements.	Tractive Force (75 per cent.).
				lbs.
GA ..	1921	1	2.6.0+0.6.2	47,385
GB (1st order)	1921	1	2.6.2+2.6.2	18,296
GB (2nd order)	1924	6	2.6.2+2.6.2	18,188
GC ..	1924–5	6	2.6.2+2.6.2	28,470
GCA ..	1927–8	39	2.6.2+2.6.2	28,477
GD ..	1925–6	14	2.6.2+2.6.2	32,040
GE (1st order)	1925	6	2.8.2+2.8.2	46,140
GE (2nd order)	1927	10	2.8.2+2.8.2	46,140
GF ..	1927–8	65	4.6.2+2.6.4	34,200
GG ..	1925	1	2.6.2+2.6.2	39,900
GH ..	1928	2	4.6.2+2.6.4	44,475
GK ..	ex N.C.C.R.	2	2.6.2+2.6.2	31,260
GL ..	1929	2	4.8.2+2.8.4	71,660
HF ..	1927–8	11	2.8.2+2.8.2	46,140
FC ..	1925	1	2.6.2+2.6.2	28,470
FD ..	1926	4	2.6.2+2.6.2	32,040
U ..	1927	10	2.6.2+2.6.2	50,000

"The 'Garratt' type of locomotive is exceedingly popular in this country. Including two 'Garratts' taken over from the New Cape Central Railway (Class G.K.), and including the so-called 'Modified Fairlie' type, there are some 181 locomotives of this type in operation on the 3 ft. 6 in. gauge lines of the South African Railway system. On the 2 ft. narrow-gauge lines there are also several 'Garratt' type locomotives (Class NG/G), built by Krupp, in service.

"They represent the construction of many firms, including Beyer Peacock and the North British Locomotive Company, and the German firms of Henschel, Hanomag and Maffei. They are distributed over most of the S.A.R. system, though no less than 70 of them are in the Durban division, and are used on the main line to Pietermaritzburg, and also particularly on the North and South Coast lines. The Class GL locomotives are, of course, by far the most powerful locomotives in this country, the next most powerful being the two 2-10-2 locomotives of Class 18 (No. 1360/1), which were introduced in 1927 for working the heavy coal traffic over the 80 miles between Witbank (the centre of the Transvaal coal-mining area) and Germiston (near Johannesburg). These massive locomotives, which were built by Henschel & Co., have 215-lb. boiler pressure, three cylinders 21¼ in. × 28 in., a heating surface of 3,223 sq. ft., and develop a tractive force of 53,200 lb. They haul loads of 1,800 tons between Witbank and Germiston. Both engines are stationed at the Germiston sheds. Germiston is perhaps the most important junction on the S.A.R. system, and is situated some nine miles from Johannesburg. Here the line from Johannesburg divides, one branch going to Pretoria, one to the East Rand, Witbank, and Portuguese East Africa, and another to Natal, and also to Cape Town and Cape Province, generally via the Orange Free State."

Mr. Brierley sends a series of photographs, but, unfortunately, they are not altogether suitable for reproduction. One shows an interesting class of locomotive—a tank engine with a tender. "Apart from one or two engines on the Festiniog Railway, in Wales, I have never seen a tank-tender locomotive outside this country. There are two classes here (Classes 13 and 17), both of the 4-8-0 wheel arrangement. Of Class 13 there are 30 engines, and of Class 17 there are 17 engines, and I believe that both classes are rebuilt from tank locomotives, with the conventional coal bunker. They are used for yard shunting and the assembly of goods trains. The locomotives of the S.A.R. system are exceedingly interesting to a student of locomotive design, because, though there are

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only some 2,300 in the country, they are of about 120 different classes and sub-classes."

United States and Continental Expresses.

I TAKE pleasure in enclosing a few leaflets descriptive of the winter schedules of the New York Central Railroad's New York-Chicago service. With the introduction of the "Commodore Vanderbilt" and the "Advance 20th Century Limited" on September 29, the line now operates 15 trains daily from New York to Chicago, with through sleeping cars. Of these seven make the journey in 21 hours or less, and all but two in under 28 hours, thus making the extra fare charge permissible. Six of these trains include an observation sleeper and club car in their equipment in addition to Dining Cars and the usual Pullmans. All use the tracks of the N.Y.C. as far as Buffalo (436 miles), from where there is a choice of two routes to Chicago, the longer being *via* the Michigan Central Railroad. The fastest train routed over this section is the "Wolverine," recently accelerated to run the 973.6 miles from New York to Chicago in 20 hours flat, at an average speed, including stops, of 48.7 m.p.h., thus becoming the fastest long-distance train in America, a position held until now by the "Southwestern Limited."

In addition to the 15 Chicago trains mentioned, this line operates nine other long-distance passenger expresses out of New York daily, totalling a minimum of 24 trains. Any one of these may be run in two or more sections when occasion demands, which is frequently the case. These 24 trains average a run of about 800 miles over N.Y.C. tracks.

While the German State Railways with the greatest length of line in Europe might be expected to offer competition to some of these figures, the services in that country are nowhere dense enough to make an interesting comparison. The P.L.M., however, which is at present operating 22 long-distance expresses out of Paris daily, offers the only possible challenge to the achievement of the N.Y.C. Of these 22 trains 12 have their destination at Marseilles or towns on the Riviera, using P.L.M. tracks for the entire journey of 697 miles maximum; five travel to Italy *via* the Mont Cenis Tunnel, using their own rails for 418 miles, and the remaining five are bound for Lausanne and the Simplon Tunnel, using P.L.M. lines for 285 miles. Any attempted comparison in the speeds of these trains would be very detrimental to the French trains, as the stops beyond Marseilles are too frequent, and on the lines serving Italy the distances too short.

It will, however, be readily seen that the New York Central, averaging one 800 mile train at every hour of the day, certainly justifies its claim to operate "the greatest fleet of fast long-distance passenger trains in the world."—HUGO R. KOENIG.

New Zealand Railway Notes.

OUR railways here are reminiscent somewhat of the home companies the way they are out to entice railway travel. Very cheap Sunday excursion trains for long distances are the latest. For an instance of what I refer to, Auckland and Hamilton are about 87 miles apart, yet (starting in November last) an excursion train leaves either place and returns in the evening for the small sum of 5s. for the double trip. This surely compares pretty favourably with the English excursion rates, I presume.—[C. J. HOUSEGO.]

"The Cascade Limited."

WITH reference to Mr. Crickmay's article in the January number of THE RAILWAY MAGAZINE, and his account of the run from Portland to 'Frisco on the "Cascade Limited" (No. 17), it may be of interest to your readers to know that the 4-8-2's work through from the former station to Gerber (arrive 2.45 p.m.), a total distance of 1,057 miles.—[W. SHIRLEY.]

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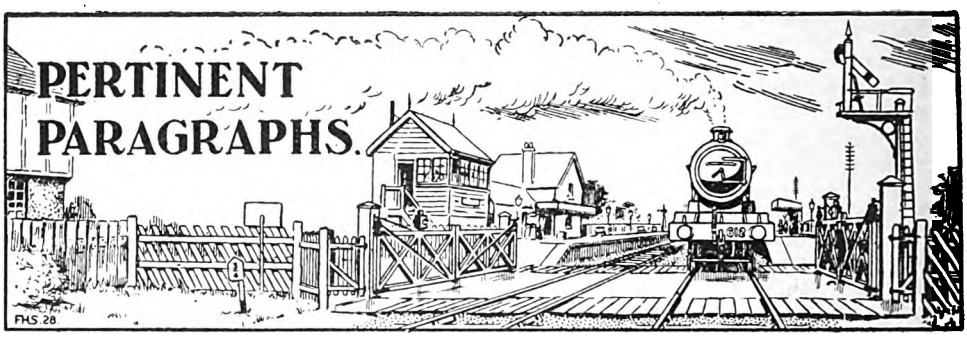

The Southern Railway in 1930.

DETAILED particulars are now available of the Southern Railway programme of new works, &c., for 1930, representing an authorised expenditure of about £4,300,000. A further 20 engines of the 2-6-0 main-line passenger class are to be built as supplementary to the new "Lord Nelsons" recently completed, and the new "Schools" class three-cylinder engines due to appear in the next two or three months. There will also be some new three-cylinder goods engines. Rolling-stock provided for covers 300 corridor coaches, 16 restaurant cars, 40 luggage vans, 40 general utility vans, and 50 special passenger-train cattle vans, with nearly 2,000 additions to wagon stock. Special coaches are also to be built in connection with the proposed extension of electric working to Brighton. Further goods and parcels road transport vehicles are to be added, while the engineers' side includes quite an elaborate programme of new works, comprising items authorised and not yet begun, and works authorised and partially completed. These cover new station buildings, reconstructions, widenings and permanent-way alterations, &c. Electrification extensions from Dartford to Gravesend, Wimbledon to West Croydon, and Twickenham to Windsor are expected to be completed this summer. New Channel steamers, paddle steamers for the Portsmouth-Ryde service, and another motor-car ferry vessel, and improvements at Fishbourne also figure, while extensive particulars are given of the progress of the Southampton Docks Extension Scheme and associated and new works.

More Large Wagons for the L.N.E.R.

THE L.N.E.R. is to construct 25 additional 50-ton wagons for the conveyance of bricks and 125 20-ton wagons for the carriage of locomotive coal. This is in accordance with the L.N.E.R. policy of providing large wagons wherever they can be usefully employed. Wagons, each of which will hold 40 tons, have been used by the L.N.E.R. for the past 27 years to carry coal from the Ashington Collieries to Blyth for shipment. At the present time there are 130 of these wagons in use. Wagons holding 40 tons of coal are used for engine purposes on the L.N.E.R. This type of wagon has been used since 1904, and there are now 25 of these wagons fitted with vacuum brakes to enable them to run on fast freight trains. A large number of 20 and 30-ton wagons are also used for engine coal purposes on various parts of the system.

Large goods wagons of the following types also in service on the L.N.E.R. include:—

50-ton brick wagons fitted with automatic brakes.
20 and 40-ton flat wagons for steel tubes, timber, &c.
20, 25, and 30-ton iron and steel flat wagons.
25-ton covered wagons.
20-ton pig-iron wagons.

The L.N.E.R. possesses the biggest composite wagon in the country. This wagon has no less than 56 wheels, and is capable of carrying exceptional and ungainly masses of metal or machinery up to 150 tons in weight.

The Oxford & Aylesbury Tramroad.

MR. L. D. WILLOUGHBY writes:—"I notice in the November number an inquiry by Mr. A. G. T. Mosley *re* the geared locos. which used to work on the Aylesbury and Brill Tramroad. One of these engines is still at work, and the following details will, I hope, be of interest to your correspondent. The engine is stationed at a brick-yard near Weedon (Northants), on the left-hand side of the main L.M.S. line, going north, about one mile before enter-

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ing Weedon station, and can often be seen in its shed and occasionally at work in the yard. About seven years ago I went to see this engine, and had a long talk with the driver, who was apparently used to dealing with curious sightseers. The engine is still capable of pulling several trucks fully loaded, and used to work on to the main line, where it was subject to the facetious remarks of the L.N.W.R. goods drivers who had stopped to pick up the trucks. The following is, as far as I can recollect, the route to the brick-works from Weedon. The main London road is taken, up a hill and over the canal, and, when on the descent on the other side, a turning is taken to the left. This, I think, brings you to the brick-yard, but anyone in the neighbourhood will give the necessary directions, as the old machine seems to be one of the local sights. It is well worth a visit to view this curiosity, which is, I think, almost unique."

Further Notes.

MR. C. HUTTON, of Bradford, writes:—"In reply to the query of Mr. A. G. J. Mosley with reference to the Aylesbury and Brill Tramroad in Pertinent Paragraphs in the November number, in an article under the title of 'The Oxford and Aylesbury Tram Road,' by F. Goodman, in the RAILWAY MAGAZINE, November, 1899, there is a description of the two original traction engine type of locomotives employed. The dimensions given were: —

"Single cylinder, 7¾ ins. diameter and 10 ins. stroke, wheels on the rail 3 feet diameter. The motion on top of the boiler was similar to a traction engine, the connecting rod driving a shaft with flywheel at one end, but the transmission of the power to the running wheels on the rails differed in that instead of it being by gearing direct, a chain passed from a toothed wheel on a counter shaft round toothed wheels on both axles of the running wheels. In an article on the 'Locomotive History of the Metropolitan Railway,' in the RAILWAY MAGAZINE, January, 1909, page 49, is a very good photograph of one of these interesting locomotives, with a description. The driving chain can be plainly seen, and is said to have cost 16s. per foot. The engines were supplied by Messrs. Aveling & Porter, of Rochester, the well-known traction and road engine makers, in January and June, 1872, to the Duke of Buckingham, who defrayed the cost of the construction of the tramway.

"In an article that appeared in another number on the construction of the extension of the Bergne-Voss Railway, in Norway, to Oslo, a photograph was given of a similar locomotive of a contractor's train, but fitted with a roomy cab. The saddle tank locomotive mentioned by Mr. Moseley must have been the one supplied by Messrs. Manning, Wordle & Co., of Leeds, in 1878, subsequently named *Huddersfield*, possibly it was originally named *Earl Temple*. This engine is mentioned in both articles."

Some Reminiscences.

MR. S. G. WILSON also writes:—"In 1926 I met at Brill an old driver, who gave me the following particulars of the old Brill line. His remarks were confirmed by the guard, who was a native of the place. The track till comparatively recently was that originally laid by the Oxford and Aylesbury Tramroad Co., and was a light wrought-iron rail. It was in very bad condition, especially near Wood Siding, and derailments were frequent. Some of the old rails were used in constructing the spur to the brick and tile works near Wood Siding, I think. The old three-compartment coach, which was the sole vehicle in use at one time for passengers, still stands, minus its wheels and springs, in Brill station. There was, so far as my informant remembered, at that time only one engine, an overtype, as Mr. Mosley suggests, but chain driven on to four driving wheels. Chain breakages were frequent, and on one occasion an engine-driver is said to have been injured by the chain flying off. The description given me of this engine bears a close resemblance to that given in the "Chronicles of Boultons Siding," date about 1870.

"In 1926 the guards' time-sheets, &c., still bore the heading, 'Oxford and Aylesbury Tramroad.' When I last visited the line a few weeks ago these were no longer in evidence."

Music by Train.

THAT musical reproduction, either by direct wireless reception or by transmitting selected gramophone programmes throughout a train on wireless principles, will be a feature of long-distance main-line rail transport can be accepted as practically certain. Indeed, on the Canadian National Railways, not only has wireless been standard for several years, but the railway company is itself responsible for the installation of a chain of radio stations, though the object is to benefit settlers and residents in the towns, especially the smaller ones, as well as train passengers. Wireless reception is, moreover, already in use to some extent,

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and has been the subject of trial installations on a number of Continental and some United States railways, as well as in other parts of the world. In this country, however, despite a number of tests and several special instances, such as the broadcasting of the Derby on a L.N.E.R. train last year, the matter is still in the trial stage. A number of special problems apply here, and it is not yet clear as to the best methods of installation. A further test, by arrangement between the L.N.E.R. and the Pullman Car Co., Ltd., was carried out on January 29, a train of nine Pullman cars being run from King's Cross to Hatfield and back utilising both B.B.C. reception and gramophone reproduction.

G.W.R. Locomotives.

LAST year the mileage run by Great Western Railway locomotives reached the highest figure in the history of the railway, being over ninety-seven million miles, or about two million miles more than in the previous year. The building of a large number of powerful express passenger locomotives has effected very considerable economies, viz., in the haulage of heavier and longer trains, reduction in the use of banking engines on the steep gradients, and by increasing the availability of the stock. Some indication of the improvement made in the use of the stock is shown by the fact that the number of engines has been reduced from 3,940 to 3,858, notwithstanding that the miles run increased from 95,060,257 to 97,130,000.

The following new engines have been turned out of Swindon Works:—

Passenger 4-6-0 "Hall" class:—No. 4961, *Pyrland Hall*; No. 4962, *Ragley Hall*; No. 4963, *Rignall Hall*; No. 4964, *Rodwell Hall*; No. 4965, *Rood Ashton Hall*; No. 4966, *Shakenhurst Hall*; No. 4967, *Shirenewton Hall;* No. 4968, *Shotton Hall;* No. 4969, *Shrugborough Hall;* No. 4970 *Sketty Hall;* No. 4971, *Stanway Hall.* Goods or Passenger:—2-6-2T, Nos. 5102-3-4-5-6-7-8-9-10; 0-6-0T, Nos. 5780-1-2-3-4-5-6-7; 0-6-0T, Nos. 7725-6-7-8-9-30-1-2-3-4-5-6 (North British Locomotive Co. Ltd.).

The undermentioned numbers and names have been selected for the next 10 "King" class engines:—

6020, *King Henry IV*; 6021, *King Richard II*; 6022, *King Edward III*; 6023, *King Edward II*; 6024, *King Edward I*; 6025, *King Henry III*; 6026, *King John*; 6072, *King Richard I*; 6028, *King Henry II*; 6092, *King Stephen.*

Hall Class Locomotives: G.W.R.

FOR completeness, and in response to requests from readers, we give a list of these engines to date:—

No.	Name.	No.	Name.
4900	*Saint Martin.*	4936	*Kinlet Hall.*
4901	*Adderley Hall.*	4937	*Lanclay Hall.*
4902	*Aldenham Hall.*	4938	*Liddington Hall.*
4903	*Astley Hall.*	4939	*Littleton Hall.*
4904	*Binnegar Hall.*	4940	*Lidford Hall.*
4905	*Barton Hall.*	4941	*Llangedwyn Hall.*
4906	*Bradfield Hall.*	4942	*Maindy Hall.*
4907	*Broughton Hall.*	4943	*Marrington Hall.*
4908	*Broome Hall.*	4944	*Middleton Hall.*
4909	*Blakesley Hall.*	4945	*Milligan Hall.*
4910	*Blaisdon Hall.*	4946	*Moseley Hall.*
4911	*Bowden Hall.*	4947	*Nanhovan Hall.*
4912	*Berrington Hall.*	4948	*Northwick Hall.*
4913	*Baglan Hall.*	4949	*Packwood Hall.*
4914	*Cranmore Hall.*	4950	*Patshull Hall.*
4915	*Condover Hall.*	4951	*Pendeford Hall.*
4916	*Crumlin Hall.*	4952	*Peplow Hall.*
4917	*Crosswood Hall.*	4953	*Pitchford Hall.*
4918	*Dartington Hall.*	4954	*Plaish Hall.*
4919	*Donnington Hall.*	4955	*Plaspower Hall.*
4920	*Dumbleton Hall.*	4956	*Plowden Hall.*
4921	*Eaton Hall.*	4957	*Postlip Hall.*
4922	*Enville Hall.*	4958	*Priory Hall.*
4923	*Evenley Hall.*	4959	*Purley Hall.*
4924	*Eydon Hall.*	4960	*Pyle Hall.*
4925	*Eynsham Hall.*	4961	*Pyrland Hall.*
4926	*Fairleigh Hall.*	4962	*Ragley Hall.*
4927	*Farnborough Hall.*	4963	*Rignall Hall.*
		4964	*Rodwell Hall.*
4928	*Gatacre Hall.*	4965	*Rood Ashton Hall.*
4929	*Goytrey Hall.*	4966	*Shakenhurst Hall.*
4930	*Hagley Hall.*	4967	*Shirenewton Hall.*
4931	*Hanbury Hall.*	4968	*Shotton Hall.*
4932	*Hatherton Hall.*	4969	*Shrugborough Hall.*
4933	*Himley Hall.*	4970	*Sketty Hall.*
4934	*Hindlip Hall.*	4971	*Stanway Hall.*
4935	*Ketley Hall.*		

Some London Railway Figures.

IN Greater London alone last year the railways carried 929,521,919 passengers.

The number of passengers using the big main-line terminal stations in London each day, together with those carried by the "Underground" companies, amounts to a total of nearly 3,000,000.

There are 580 passenger stations within a 10 miles radius of Charing Cross. These are divided up as follows:—

G.W.R	22	Southern	200
L.N.E.R.	98	Metropolitan	60
L.M.S.R.	75	"Underground"	125

There are scores of other stations in what may rightly be called Greater London.

The statistics of passengers per day at main line termini are:—

Paddington, 55,000; King's Cross, 60,000; Liverpool Street, 230,000; Marylebone, 10,500; Euston, 60,000; St. Pancras, 30,000; Fenchurch Street, 50,000; Broad Street, 120,000; Waterloo, 121,000; Vic-

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toria, 96,500 ; London Bridge, 135,000 ; Charing Cross, 59,000 ; Cannon Street, 57,000 ; Holborn and St. Paul's, 44,000 ; Waterloo & City, 28,000 ; and at Baker Street as many as 637 cars are dealt with in an hour.

At these stations alone over 9,000 trains are dealt with every day, and to be added to this enormous total are the thousands of "Underground" trains which run at peak periods with intervals that can be measured in seconds.—From *The Railway Newsletter*.

Proposed Tube for Ilford.

A STATEMENT issued by the L.N.E.R. indicates that a scheme for electrification of Great Eastern Section suburban lines had been prepared, but the company was satisfied that no such scheme by itself would provide an adequate solution of the problem. The construction of a tube for the conveyance of suburban traffic between Liverpool Street and Ilford was, therefore, under consideration, and plans and estimates of cost were accordingly being prepared. That some such step will have to be undertaken, in default of prohibitively expensive widenings and station enlargements on the existing route, has been evident for some time, and although the official statement does not definitely state that suburban electrification or new tube construction are to be immediately initiated, it does substantiate the view that active steps to meet the admittedly serious problem of dealing with Liverpool Street suburban traffic, especially that of the Ilford route, is now being definitely approached. Apart from the usefulness of the proposed tube line in meeting present traffic requirements, and providing for further development, the scheme has definite value in that it will enable outer-suburban traffic to be catered for to a degree which is not practicable under present conditions.

Selling Transport.

IN the course of an address under this title, by Mr. C. G. Dandridge, Advertising Manager, L.N.E.R., to the Incorporated Society of British Advertisers, some interesting statistics and illuminating comments were given. About 1,300,000,000 tickets are sold and 7,500,000 meals served in restaurant cars by British railways in the course of a year, while the L.N.E.R. alone carries over 1,000,000 passengers daily, and 150,000,000 tons of freight per annum, thus indicating how great are the "attraction" possibilities of railway advertising. About £56,000 is spent by the L.N.E.R. on the handbill type of publicity, it has 72,000 double royal poster spaces, while other important sections of publicity are letter press and pictorial posters, the "Variety" programme, and a wide range of literature. Mr. Dandridge spoke at length in regard to the railway pictorial poster, its many applications, its world-wide distribution, the variety of subject-matter, and the extent to which the services of the leading poster artists of the day are utilised. He also discussed general newspaper advertising and "prestige," or "reminder" advertising, as to which experiments are constantly being made. There are also the special literature and posters provided for use by agents abroad. The Advertising and Public Relations Committee of the Railway Clearing House joint railway propaganda and other matters were touched upon. In conclusion, Mr. Dandridge gave an outline of the organisation and methods of the L.N.E.R. Advertising Department.

G.W.R. New Colour Scheme for Rolling-Stock.

ALL third-class corridor and restaurant-car stock built by the company will be decorated in new style. The upholstery of the compartments will be in grey and black moquette with grey predominating. The floors will be covered with grey linoleum with black-line border, and the interior panelling finished in walnut colour. The ceilings will be white enamel. In addition, the seats will be ½ in. wider, and the lowering of the arm-rest by 1 in. will make for greater comfort. The general impression of the compartments is that they are lighter and more cheerful and are sure to meet with the approval of the travelling public. At present the standard colours are red and black upholstery with brown linoleum. The only alteration to the first-class compartments is the raising of the arm-rests by 1 in. This close study of details such as above shows the company's desire to give the public the most cheerful and comfortable travel possible.

The exterior of the coaches will remain the same, chocolate and cream, but additional grace has been lent by the gilt lining of the coaches, the fitting of chromium-plated door handles and slam locks, and large lettering of the words "First" and "Third" on the exterior of the carriage doors. The distinctive roof boards have also been improved by additional lining of the letters. Another feature which has recently been introduced by the company is the fitting of Vita glass, which permits the entrance of violet rays, so beneficial to health, on the two new Cornish Riviera express trains. These coaches, which are

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9 ft. 7 in. wide, are the widest stock in use in the country, and Empire-grown timbers have been largely used in construction.

Irish Locomotive Notes.

MR. K. DAVISON sends the following:—

"On a recent visit to Kingsbridge station the following observations were made:—333 class 4-4-0, No. 335, left on 7.15 p.m. night mail for Cork. Rebuilt 4-4-0, No. 323, arrived on up Limerick and Clonmel train. 400 class 4-6-0, No. 405, arrived on Up English Mail. 333 class 4-4-0, No. 337, was shunting in the passenger yard. No. 338 is the only engine of the 333 class rebuilt so far, although Nos. 334 and 337 have been in shops recently. 101 class 0-6-0 Nos. 160, 191 and 156 were shunting in the goods yard. 2-6-0 No. 356 left on a 60-wagon Cork goods train banked by a 0-6-2T. 400 class 4-6-0, Nos. 401 and 406, are to be fitted with Caprotti valve gear. A new class of 0-6-0 standard goods locos. is now being finished off at Inchicore. They are to be numbered from 700, and the first (No. 700) went for a test run on November 26, 1929. The other four are to be out at the end of the year 1929."

Fletcher Engines, N.E.R.

MR. W. B. THOMPSON writes:—"THE RAILWAY MAGAZINE announces that the last of the Fletcher engines have now disappeared from the North Eastern line. Edward Fletcher's reputation suffered owing to an unfortunate series of boiler explosions, but his engines, both passenger and goods, did their work well, and in some respects were ahead of their contemporaries. They had ample boiler power, and the engines built after 1868 had comfortable cabs. The men were well protected from the weather, and on each side of the cab was a large tool box, the top of which made a convenient seat. Some of the engines had duplicate gauge glasses. Though at that time it was customary to rely entirely on the hand brake on the tender, the Fletcher engines were also given brakes on the engine wheels, a separate handle being provided on the footplate to apply them. There is much to be said for the independent braking of engine and tender, but I have hardly ever seen it adopted elsewhere. I knew the Fletcher engines well fifty years ago, and think that railway historians have not always given them the attention they deserved."

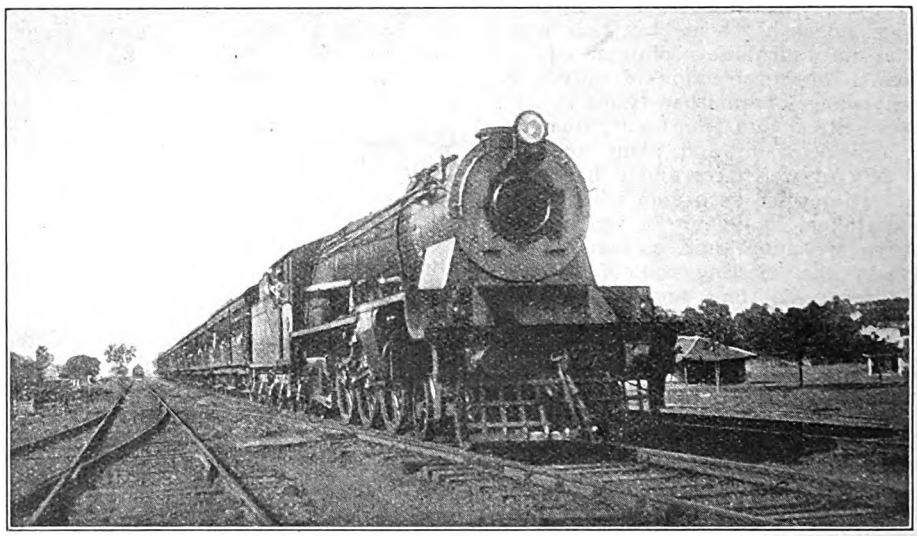

Photo.] [*W. H. C. Kelland.*

NEW 4-6-2 FOUR-CYLINDER COMPOUND No. 793, BENGAL-NAGPUR RAILWAY, ON NAGPUR EXPRESS.

Railway Consolidation in U.S.A.

ACCORDING to a report by the Interstate Commerce Commission, a suggested consolidation of U.S.A. Class I railways with the following systems is put forward:—

(1) Boston & Maine; (2) New Haven; (3) New York Central; (4) Pennsylvania; (5) Baltimore & Ohio; (6) Chesapeake & Ohio-Nickel Plate; (7) Wabash-Seaboard;

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(8) Atlantic Coast Line ; (9) Southern ; (10) Illinois Central ; (11) Chicago & Northwestern ; (12) Great Northern-Northern Pacific ; (13) Milwaukee ; (14) Burlington ; (15) Union Pacific ; (16) Southern Pacific ; (17) Santa Fe ; (18) Missouri Pacific ; (19) Rock Island-Frisco ; (20) Canadian National; (21) Canadian Pacific.

Mr. Paul F. Laning, of Fostoria, Ohio, comments as follows:—" There is nothing in the plans that specify that the railroads must consolidate into the twenty-one systems shown in the plans. Since several plans for mergers have come before the commission during the last five years and were rejected, the members of the commission set about to show what plans might be acceptable and serve the public interest. The commissioners themselves are somewhat in disagreement over the consolidations. One commissioner thinks four systems ample in the Eastern territory of the United States, while another one thinks that nine systems would not be too many for the same territory.

" The Federal law forbids a railroad corporation to acquire additional track from other roads without approval of the Interstate Commerce Commission. In order to circumvent the law, several railroads have created ' holding companies ' to acquire additional mileage, and thus get away from the jurisdiction of the Interstate Commerce Commission. The holding company is made up of officials of the railroad, and purchases securities of the companies it wants ' out in the open ' and ' above board,' and still escapes the disapproval of the Interstate Commerce Commission, because of the lack of jurisdiction of that body. . . . Railroad consolidations present a continual warfare, and contribute much copy for the newspapers, as well as provide much conjecture among railroad employees and the shipping and the travelling public."

L.N.E.R. Observations.

Mr. R. A. H. Weight writes:—" No. 10,000, painted shop-grey, with dynamometer car attached, ran light from Darlington to King's Cross on Tuesday, January 7, arriving about 4.15 p.m. She was inspected by officials and press representatives on the following morning, and ran a trip with a short train to Hitchin and back subsequently. The dynamometer car was attached to the 5.30 p.m. express to the North-Eastern Area the same evening, and the new *Baltic* returned light to Darlington on Saturday, January 11, for completion, arousing much interest *en route*.

" The King's Cross 4-6-2, 4475 *Flying Fox* went to Doncaster Works for general overhaul on the last day of 1929, after having run considerably over 100,000 miles since last leaving the shops. Even for Gresley Pacifics this was a notably high total. Just before Christmas she worked the 10 a.m. from Edinburgh right through to King's Cross (having gone from Newcastle to Edinburgh in the early morning) against a furious southerly gale with a load

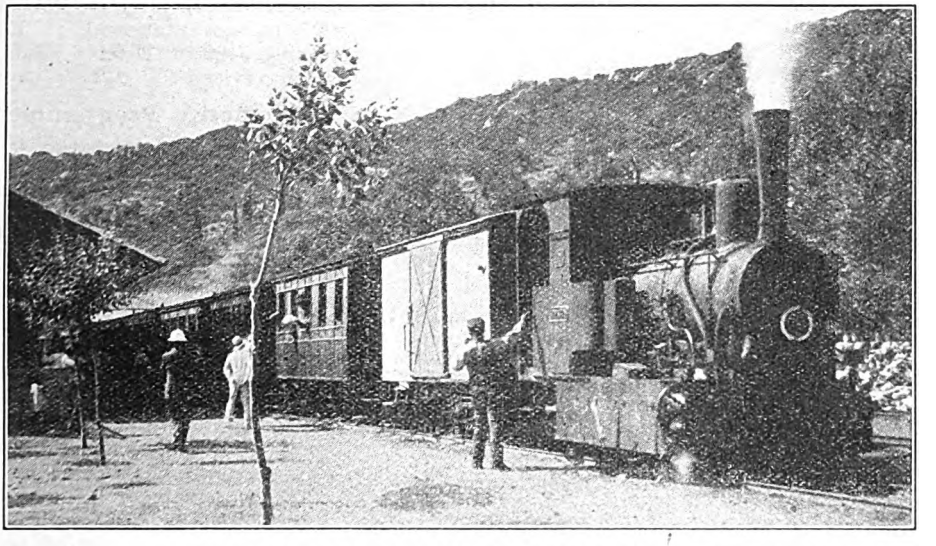

Photo.] KATAKOLO-PYRGOS TRAIN LEAVING KATAKOLO, GREECE. [*C. W. Phillips.*

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of 470 tons without loss of running time. The train was held up at Escrick owing to the presence of hounds on the line, which caused rather a serious delay which it was not possible to recoup in view of the tempestuous weather, but permanent-way-slack losses of time were recovered. Needless to say, the demands upon the ample coal supply contained in the corridor tender were considerably heavier than is usual when both load and elements are kinder."

Interesting Excursion Runs.

"It would be interesting to know if the long-distance half-day excursions run (*a*) from Newcastle to London (268½ miles) and (*b*) between London and Leeds (186 miles in 222 minutes) constitute respectively records for (*a*) length of journey covered by such booking, (*b*) running speed (50 m.p.h.) of a regularly scheduled similar special over a comparable distance," writes Mr. R. A. H. Weight. He comments as follows:—"The Newcastle, &c., to London half-day special, due in at 4.15 p.m., has just passed as I write, and will leave King's Cross on the return journey at 11.50 p.m. It runs about once a month, and always consists of thirteen or fourteen corridor and restaurant cars, "Pacific" hauled. The Leeds Diner trips are run every few weeks on Sundays in both directions, and convey no intermediate passengers whatever. The outward excursion to London leaves Leeds (Central) at 10 a.m., and is due King's Cross at 1.42 p.m., stopping only near Ardsley, to detach assistant engine, if necessary. The load is usually about 350 tons, and the engine, a Director 4-4-0 or Immingham 4-6-0 (G.C.), stationed at Copley Hill. The similar excursion from London at 10 a.m. is always very popular, and, consequently, heavily loaded. On a Sunday in January it was hauled throughout by King's Cross Atlantics 4444 and 4440 with a load of 455 tons gross behind the tenders, when some very fast running was made. Doncaster, 156 miles, was reached (eleven minutes early) in 166 minutes, despite delays costing nearly six minutes, so that the running average equalled 58½ m.p.h.! The throughout actual time to Holbeck was only 214½ minutes, or 196 minutes net, for the 185½ miles, which seems splendid fare for passengers who paid less than one-third of a penny per mile for their return tickets!

"The same non-stop timing of 177 minutes to Doncaster, equalling 52¾ m.p.h., is scheduled for the Bradford and Halifax and Hull and York half-day excursions, which run on various alternate Sundays from King's Cross. These are almost invariably Pacific hauled and are heavy trains. The return schedules during the night are not quite so rapid, there being no hurry in view of the arrival time back at the starting points being in the neighbourhood of 4.30 a.m. Football Cup-ties are already producing much interesting special express excursion operation, and, as the season advances, the railway traffic enthusiast watches the results of the matches and 'draws' with as much interest, perhaps, though with a different motive in view, as the keenest devotee of professional Soccer and his pet players thereof. G.W. 4-cyl. 4-6-0 *Tresco Abbey* (Old Oak) worked a Football Special through from Reading to Nottingham (L.N.E.) on Saturday, January 18. G.C. 4-6-2T 5007 is now stationed at King's Cross, replacing 5129 on Hitchin, Baldock, &c., semi-fast services."

L.N.E.R. Locomotive Programme for 1930.

The L.N.E.R. announce that 144 new locomotives are included in their 1930 engine-building programme. Amongst them are 15 of the "Sandringham" 4-6-0 type, similar to those which are at present working the principal expresses between Liverpool Street and the Eastern Counties. Fifteen "Shire" class engines for use on express passenger trains in the North of England are also included in the programme, and, in addition to these, 26 side-tank engines of the 3-cylinder 2-6-2 class; five of these are for use on L.N.E.R. lines in the Eastern Counties, Lincolnshire and the Midlands, the remainder being used in Scotland.

The remaining engines consist of 14 K.3 class 2-6-0 three-cylinder fast goods engines for use in all parts of England; 15 three-cylinder 2-8-0 mineral engines for use in the Southern districts; 35 standard six-wheeled coupled engines of the J.39 class for use on all L.N.E.R. lines; 20 standard small shunting engines of the 0-6-0 J.72 type; two 2-8-2 side-tank engines and two 0-8-4 class S.1 side-tank engines for shunting purposes.

A new 200-H.P. steam rail coach has recently been undergoing trials in Yorkshire. The car weighs 47 tons, and is propelled by two standard six-cylinder single-acting Sentinel engines, and a boiler of the water-tube type. It is intended to place a car of this description at Guisborough, North Yorkshire, in substitution of the present steam trains.

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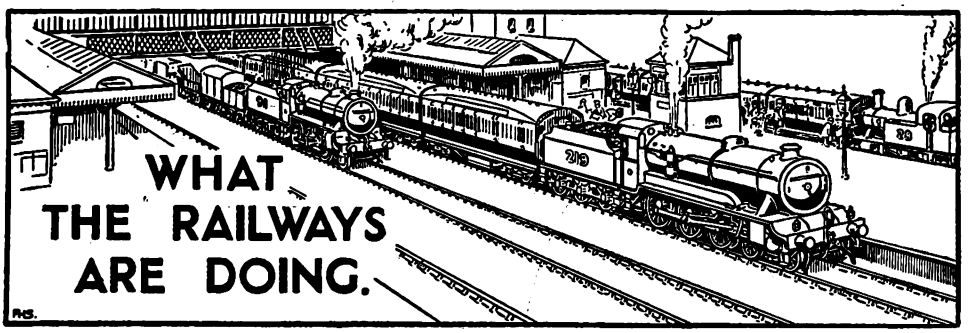

At a meeting of the Irish Railway Clearing House Committee held at 5, Kildare Street, Dublin, Sir Walter R. Nugent, Bart., was unanimously re-elected Chairman of the Committee for the year 1930.

* * *

Sir Josiah Stamp, President of the Institute of Transport, occupied the chair at an ordinary meeting of the Institute on January 13, when Mr. Ashton Davies, General Superintendent (Passenger Commercial), L.M.S.R., read a paper on "The Co-ordination of Transport."

* * *

Mr. A. Newlands, Chief Engineer, L.M.S.R., has been elected Chairman of the Railway Clearing House Civil Engineers' Committee for the year 1930.

* * *

Mr. John F. Sides, A.E., M.Inst.C.E., M.Inst.C.E.I., has retired from the position of Chief Engineer to the Great Southern Railways, Ireland. No announcement has yet been made of his successor.

* * *

New L.M.S.R. Appointments.

Mr. W. E. C. Lazenby to be Principal Assistant to the Chief Officer for Labour and Establishment.

Mr. F. A. Pope to be Assistant to the Chief Officer for Labour and Establishment.

MR. E. H. DAVIES,

Appointed Assistant Chief Goods Manager, London Midland & Scottish Railway.

Mr. E. H. Davies, who has been appointed Assistant Chief Goods Manager, London Midland & Scottish Railway, has held the position of Goods Operating Manager, Euston, since January, 1928, prior to which he was Goods Manager, Northern Division. Mr. Davies entered L.N.W.R. service as an apprentice at Park Lane station, Liverpool, and, after experience in all departments at stations, he was transferred to the District Managers' office, and had experience of reorganising work in all departments. He was then promoted to be Agent, and served in that capacity at most of the large Liverpool stations and at Birkenhead. In January, 1914, he became Assistant District Goods Manager, Birmingham. In March, 1915, he was loaned to the Ministry of Munitions as Railway Transport Officer for the Midlands, being transferred in December, 1915, to the Ministry Headquarters in London, as Assistant Director of the Railway Transport Department. Upon the establishment of the Coal Control he was transferred there, and for services rendered was awarded the O.B.E. On his return to railway service, Mr. Davies became District Goods Manager in the Northampton district, and was transferred thence to Euston in September, 1919, to take charge of a newly-created Road Transport Department. He was promoted to Manchester in 1923, as Station Working and Road Trans-

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MR. C. W. L. GLAZE,
Mechanical Engineer, Stratford, L.N.E.R., who will retire on March 31.

MR. E. THOMPSON,
Appointed Mechanical Engineer, Stratford, L.N.E.R., as from April 1 next.

MR. G. MORTON,
Appointed Assistant Accountant, London Midland & Scottish Railway.

MR. W. WOOD,
Electrical Engineer (Scotland) L.N.E.R., President, Institution of Railway Signal Engineers, 1930-31.

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port Assistant for the reconstituted L. & N.W.R., consisting of the L. & N.W., L. & Y., and a number of the smaller railways. He became Chief of the L.M.S. Road Transport Department in January, 1923, and remained in that position until receiving the appointment of Goods Manager, Northern Division, in May, 1927.

* * *

We are officially informed by the L.N.E.R. that, in consequence of the impending retirement of Mr. C. W. L. Glaze, Mechanical Engineer, Stratford, on March 31 next, the Directors have appointed as his successor Mr. E. Thompson, who for the past two years has acted as Assistant Mechanical Engineer at Stratford.

* * *

Mr. C. W. L. Glaze, who is retiring at the end of March from the position of Mechanical Engineer, Stratford, L.N.E.R., which position he has held since March, 1923, entered Great Eastern Railway service in 1885, at the age of 15 years. In 1889 he was transferred to the Drawing Office as a draughtsman, and after obtaining experience on the footplate, became an Inspector at Norwich in 1891, and District Locomotive Superintendent at Doncaster in 1892. Two years later he was transferred in a similar capacity to Norwich, and in 1899 to Stratford, becoming Works Manager in 1912. From September, 1921, he was Chief of the Running Section of the Great Eastern Railway, until taking over the appointment from which he is shortly retiring.

* * *

Mr. Edward Thompson, who has been appointed to succeed Mr. C. W. L. Glaze as Mechanical Engineer, Stratford, L.N.E.R., at the end of March, has held the position of Assistant Mechanical Engineer, Stratford, since June, 1927. Mr. Thompson was educated at Marlborough, and Pembroke College, Cambridge, took his degree in 1902, and subsequently served with Beyer, Peacock and the Midland Railway Company. He left the service of the Midland Railway Company in 1905 to join the staff of the Royal Arsenal, Woolwich, and the following year was appointed to a position in the Running Department of the North Eastern Railway. In March, 1909, he was appointed Assistant Divisional Locomotive Superintendent at Gateshead-on-Tyne, and during his service with the North Eastern Railway Company, visited America. Mr. Thompson left the service of the North Eastern Railway Company on his appointment as Carriage and Wagon Superintendent of the Great Northern Railway at the beginning of 1912, and in March, 1916, went to the Royal Arsenal, at Woolwich, on war service. In December, 1916, he proceeded to France, where he was attached to the Headquarters Staff of the Director-General of Transportation. By March, 1918, he had reached the rank of Lieut.-Colonel, R.E., had been twice mentioned in despatches, and awarded the O.B.E., Military Division. Mr. Thompson was demobilised in March, 1919, and resumed his work with the Great Northern Railway Company. In 1923 he was appointed Carriage and Wagon Workshops Manager, North Eastern Area, L.N.E.R., coming to London as Assistant Mechanical Engineer, Stratford, in 1927, as above noted.

* * *

Mr. George Morton, who has been appointed Assistant Accountant of the London Midland & Scottish Railway as from January 1, entered London & North Western Railway service (Audit Office) in February, 1901. In 1915 he was appointed an Investigator of railway companies' claims against the Government in respect of the war-time control of railways, and in 1921 became Chief Clerk in the London & North Western Audit Accountant's Department. Mr. Morton was the senior Divisional Audit Accountant in the London Midland & Scottish Railway organisation introduced as from January 1, 1923, and from 1925 to 1929 held the position of Audit Assistant to the Chief Accountant.

* * *

The President for 1930-31 of the Institution of Railway Signal Engineers is Mr. William Wood, Electrical Engineer (Scotland), London & North Eastern Railway, who commenced his railway career in 1904 as a Premium Pupil under Mr. A. F. Rock, the Electrical Engineer of the North Staffordshire Railway. He was appointed Assistant Telegraph Superintendent on the North British Railway in 1911, and succeeded the late Mr. A. F. Clement as Telegraph Superintendent in 1912. Shortly afterwards he took over the Electrical Power and Lighting. He is now responsible for the Electrical and Telegraph work in the Scottish area. He has been a Member of the Institution since 1913 and on the Council since 1924, and has been Vice-President for the 1929-30 session. He also is a Member of the Institution of Electrical Engineers and of the Institute of Transport.

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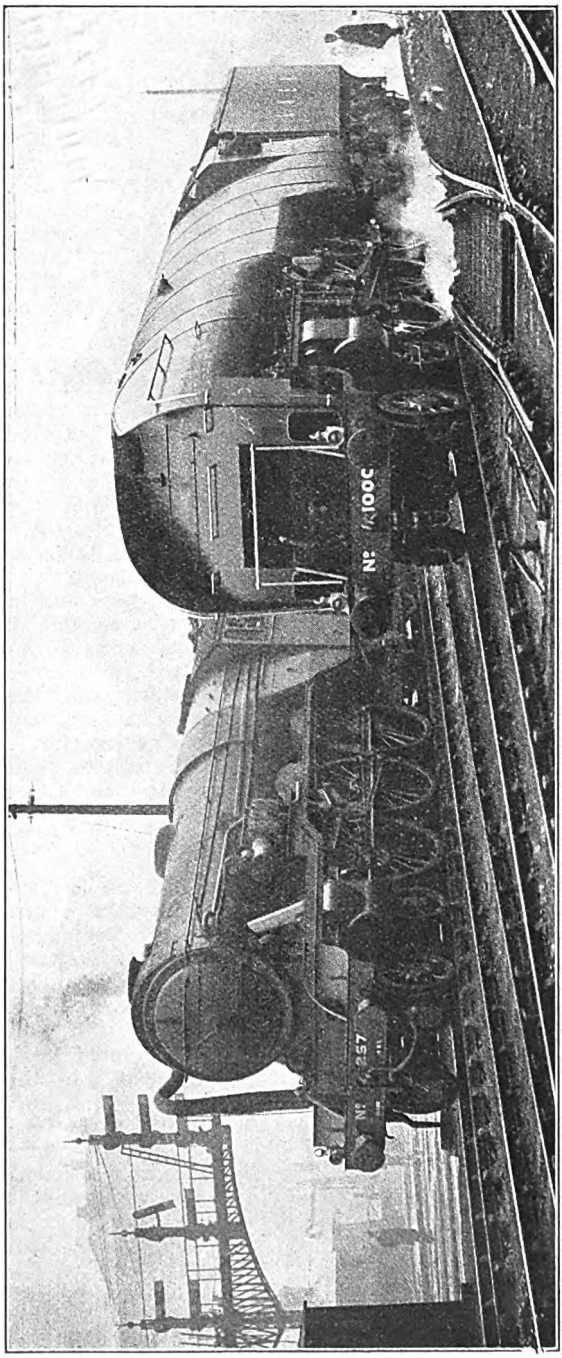
Mr. A. B. MacLeod, Assistant to the Chief Mechanical Engineer for the Isle of Wight, Southern Railway, has been appointed to control the amalgamated positions of Assistant Divisional Operating Superintendent, Assistant Divisional Commercial Manager, and Local Assistant to the Chief Mechanical Engineer and Locomotive Running Superintendent, with office at Newport. Mr. MacLeod, who was educated at Cheltenham College, entered the L.B. & S.C. Railway service as a pupil under Mr. L. B. Billinton at Brighton Locomotive Works in May, 1919. In 1923 he was appointed Assistant District Locomotive Superintendent at Brighton, and in 1925 Assistant to Eastern Divisional Locomotive Running Superintendent at Waterloo. He went to the Isle of Wight as Assistant to the Chief Mechanical Engineer and Locomotive Running Superintendent in November, 1928.



THE L.N.E.R. HIGH-PRESSURE 4-6-4 No. 10000 ALONGSIDE A STANDARD 4-6-2 LOCOMOTIVE. [*Photopress.*

* * *

We regret to record the death of Mr. F. G. Randall, District Superintendent, London District (Great Eastern Section), L.N.E.R., at his home at Gidea Park, Essex. Mr. Randall entered the service of the Great Eastern Railway Company as a clerk in the District Superintendent's office at Ipswich, on January 31, 1887. In 1901 he was appointed stationmaster at Haughley, a post which he subsequently held at Aylsham, Wymondham, Ely and Cambridge. In 1916 he was made Assistant to the District Superintendent at Norwich, and in 1923 Assistant District Superintendent for the London District, being appointed District Superintendent in 1925. Mr. Randall was Secretary of the London Choir of the L.N.E.R. Musical Society for several years.

* * *

At the London School of Economics on Thursday, January 9, Mr. R. Carpmael, M.Inst.C.E., Chief Engineer of the Great Western Railway, delivered a lecture, illustrated by lantern slides, entitled "The Maintenance of a Railway and What it Involves."

* * *

Mr. C. M. Le Gosselin pre-

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sided over a well-attended meeting of the Manchester, Liverpool and District Section of the Institute of Transport at the Midland Hotel, Manchester, on January 24, when Mr. C. Travis, M.Inst.T., Associate Editor, *The Railway Gazette,* read a paper on "The Railways of Africa."

* * *

MISS ISHBEL MACDONALD, daughter of the Prime Minister, recently launched from the shipbuilding yard of Cammell Laird & Co., Birkenhead, the first of three fast turbine steamers which the firm is building to the order of Canadian National Steamships, Montreal. A new Canadian Pacific liner, the *Princess Elizabeth,* was launched from the Fairfield Shipbuilding & Engineering Company's yard at Glasgow, and was named by Mrs. R. B. S. Reford, daughter of Mr. W. R. MacInnes, a Vice-President of the Canadian Pacific Railway.

* * *

MR. P. J. FLOYD, Traffic Manager of the Great Southern Railways, has been unanimously re-elected Chairman of the Traffic Officers' Committee (Ireland) for 1930.

* * *

WE regret to record the death, on January 11, of Mr. Henry Allaway, Assistant General Manager (Shipping), L.N.E.R. Mr. Allaway was also Continental Traffic Manager (North).

* * *

THE L.M.S.R. announce that a new locomotive depôt is to be built at Carlton, between Cudworth and Royston; 120 houses will be erected by the L.M.S.R.

* * *

PARTICULARS issued by the L.N.E.R. indicate that the 16,700 track miles of the system, serving 51 counties, involve the use of 2,360,000 tons of British steel rails.

* * *

NEARLY 4,000 people inspected the L.N.E.R. new high-pressure engine when it was exhibited on a recent Sunday at Darlington (Bank Top) station. The exhibition, admission to which cost 6d., was in aid of the Darlington railwaymen's effort for the local hospital.

* * *

THE London Midland & Scottish Railway announces that work will be started immediately on the building of twenty further "Royal Scot" locomotives. They are to be built at the L.M.S. Derby works.

THE exhibition at Charing Cross station of "Underground" signalling, train working and safety appliances, which closed recently, was visited by 186,000 people in 25 days.

* * *

THE new 2,000-ton steamer *St. Patrick,* built for use on the Fishguard-Rosslare and Channel Islands routes, was launched at Glasgow recently by Mrs. James Milne, wife of the General Manager of the Great Western Railway.

* * *

WE are advised by Mr. W. R. Culver, Secretary, Railway Convalescent Homes, that Sir Josiah Stamp, G.B.E., D.Sc., Chairman of the Board of Directors of the London Midland & Scottish Railway Company, has consented to become President of the Institution for 1930.

* * *

THE Canadian National Railways' crest, which is a feature of the decoration of the Company's locomotives, is to be carried out in a new colour scheme. The gold lettering, "Canadian National Railways," in the well-known tilted square setting, now appears on a red background, which adds considerably to the general appearance of the Canadian locomotives.

* * *

ELECTRIC heating has recently been applied successfully to the water used in sleeping cars on the East Coast Route night expresses. Two methods are at present in use: by the first method the water is heated at the terminal station prior to the commencement of the journey and maintained at a high temperature by the dynamo and battery installed for lighting, the capacity of the apparatus having been increased for this purpose; by the second method an additional independent dynamo and battery are fitted on the car, forming a complete self-contained water-heating system.

* * *

THE Great Western Railway Company has for several years let the arches of its viaduct at Bath to various traders. One arch is used by the Corporation as a mortuary, and two others were rented as a sub-police station till quite recently. They are now occupied by a wholesale fruiterer.

* * *

DURING 1929, the G.W.R. opened 25 new halts, making a total of 344 to date on various parts of the system. Two additional halts are to be opened: (1) Olmarch,

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METROPOLITAN RAILWAY PARCELS SERVICE POSTER.

between Pont Llanio and Llangybi, on December 7; and (2) Martoll Bridge, between Puncheston and Letterston, on January 1, 1930.

* * *

At Tottenham Court Road station an experiment is being made with an escalator travelling at the rate of 150 ft. a minute instead of the ordinary speed of 90 ft. a minute. If the experiment is successful the installing of faster escalators at certain stations will be considered.

* * *

During 1930, 12,000 freight wagons are to be built by the L.M.S.R. at a cost of £1,500,000. The vehicles will comprise many types, including:—Open wagons, low-sided wagons, standard mineral wagons, covered vans, for general merchandise, banana, meat, refrigerator and brake vans, cattle wagons, 20-ton steel hopper wagons, and other specially constructed vehicles.

* * *

Reconstruction of Euston Square station, Metropolitan Railway, to provide for the lengthening of platforms, is to be commenced shortly, and it is announced that this will involve the closing to vehicular traffic for a period of part of Euston Road. Application has been made to the St. Pancras Borough Council for the necessary permission. It is anticipated that the work can be then completed within six months, whereas under partial occupation 18 months would be required.

* * *

Among the L.M.S.R. train service alterations and additions which applied during February, we note the withdrawal of the through coaches, until further notice, on the 12 noon from Glasgow (St. Enoch) and the 5.50 p.m. from Manchester (Central) to Tilbury (Marine), and the workings, so far as the through coaches are concerned, on the 10.30 p.m. from St. Pancras to Tilbury and the 7.10 a.m. from Tilbury to St. Pancras.

* * *

Of the 284 stations that entered the England and Wales Section of the L.M.S. Station Gardens Competition, Alcester, Buckingham, Ockenden, Broxton, and Penns secured the five special class prizes awarded. In Scotland, out of 190 entrants, the six special class prizes have been awarded to Alyth Junction, Barnhill, Gleneagles, Prestwick, Racks, and West Kilbride.

* * *

The Great Western locomotive involved in the disaster near Stapleton Road, Bristol, on Wednesday, January 8, when a North to West express collided with a goods train, was No. 4063, *Bath Abbey*.

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THE L.M.S.R. has ordered, from the Sentinel Waggon Works Limited, four "Sentinel" shunting engines.

* * *

THE London & North Eastern Railway has placed orders for two Sentinel 200 H.P. patent geared locomotives for service on the Wisbech tramway. These locomotives will be of a special design capable of being driven from either end and will be supplied with a governor limiting speed to 14 miles per hour. The company has also placed an order for a Sentinel patent locomotive fitted with a crane and grab for lifting and loading ashes at locomotive depots.

* * *

THE L.M.S.R. has started work on a halt at the east end of Southend, nearly two miles from the main station.

* * *

THERE are 163 miles of railway sidings adjacent to the L.N.E.R. docks at Hull and 166 miles at Immingham.

* * *

A TRAIN equipped with wireless receiving apparatus has been put into service between Paris and Le Havre. Ear-phones are provided for the use of passengers.

* * *

THE L.N.E.R. announces that standardised fences are to be adopted for the whole of their system, some 12,000 miles of fencing being involved. As the old fencing requires renewal, new standard wire fences will be erected.

* * *

QUEEN STREET station, Exeter, is to be reconstructed at an estimated cost of £196,000. The old station will be thoroughly modernised, and specially adapted to deal with the heavy flow of traffic passing over the main lines to South and North Devon and North Cornwall, together with the exchange traffic with the Great Western Railway. The principal alterations provided for in the scheme include a direct entrance to the station from Queen Street on the existing road level, with new booking hall and parcels depot. An entrance with passimeter booking office will be provided by the new north road, and a new approach communicating with the platforms. The down platform and the Exmouth bay roads will be extended. There will also be increased siding accommodation and the running lines will be re arranged to facilitate working at the western end. The platform roofing will be of the "umbrella" type, similar to that at the new Wimbledon station, instead of the existing span.

* * *

Two coloured picture posters which have

TWO STEEL CONTAINERS FOR CONTINENTAL TRAFFIC, L.N.E.R.

Built by the Metropolitan-Cammell Carriage, Wagon & Finance Co. Ltd.

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lately made their appearance on the station walls of the "Underground" railways have, very deservedly, attracted considerable attention and evoked much favourable comment. They deal with metropolitan life from two aspects, the "Children's London" and the "Business Man's London," and they are so richly coloured and cleverly designed that it would be a marvel indeed if they escaped observation or failed to please those whom they are specially designed to attract. The idea underlying both posters is to show how the various "sights" of London may be reached by means of the "Underground," and the panel system of picturing is effectively employed for the purpose. The two posters are the work of Mr. R. T. Cooper.

* * *

A BATCH of Southern Railway coloured picture posters recently to hand includes one attractively designed to call attention to the company's illustrated guide to certain schools in Southern England, France, Belgium and Switzerland—the location of those in England being shown by means of a map drawn somewhat after the ancient methods, with an occasional tree or house or fearsome beast to break the monotony. A brightly-coloured bill of similar size is headed: "Speedways to the Continent," and shows the various routes from Waterloo and Victoria to France and Belgium, &c. Smaller posters deal picturesquely and forcefully with the claims of the "Southern for Sunshine" and "Holidays Abroad." Very pleasing, too, is a third poster of this series, advocating the claims of Switzerland as a summer resort—travelling by the S.R. short sea daylight routes, with emphasis on the "daylight"!

* * *

COLONEL A. C. TRENCH'S report to the Ministry of Transport on the accident at Lesmahagow, L.M.S.R., which occurred on October 16, has been issued. Owing to the breakage of a coupling link, the unoccupied 20-ton brake van of a goods train shunting at Alton Heights ran backwards down a steep gradient, was turned into a loop and derailed at the trap points, fouled the running line, and was run into by a passenger train from Hamilton to Coalburn. The driver and fireman of the passenger engine were slightly injured, and five passengers suffered from slight injury or shock. The initial cause was a fracture due to faulty welding, but it is unlikely that the flaw could have been detected on inspection. The fact that the brake van was unoccupied and failure to observe rules correctly were other factors.

IN addition to the £5,000,000 to be spent in connection with the Government's schemes to relieve unemployment, and the £700,000, the capital equivalent of the remission of passenger duty, the following items are included in the G.W.R. programme for 1930:—

161 new passenger vehicles.
30 milk and perishable traffic vehicles.
2,771 freight wagons.
10 "King" class locomotives.
20 "Hall" class locomotives.
70 tank engines.
100 horse-drawn vehicles.
56 trailers.
21 modern-type weighbridges.
A new steamer for Fishguard-Rosslare route.

The Engineering Department propose to relay 380 miles of permanent way and resleeper 90 miles of track; and the reconstruction programme for bridges and other structures composed mainly or wholly of steel will involve the use of approximately 4,000 tons of steelwork. In addition, £70,000 will be spent on new machinery.

* * *

THE L.N.E.R. announce that, as an experiment, labels bearing the words "Smoking Prohibited" are to be placed inside non-smoking compartments of main-line trains to and from Liverpool Street station. This practice is being adopted on account of the numerous complaints which are being received by the company regarding smoking in non-smoking compartments.

* * *

As we close for press, we have received a copy of Mr. W. G. Tilling's new booklet on "The Locomotives of the Southern Railway (Western Section)." It is produced in the same style as the corresponding study of Eastern Section Locomotives. The price is 3s., by post 3s. 2d. Copies can be had from these offices.

* * *

A £750,000 SCHEME by the L.M.S.R. for the improvement of their Southend line includes the provision of new passenger stations at Leigh-on-Sea and Chalkwell, and the conversion of Gale Street halt into a regular passenger station. Additional lines, which are to be electrified, will be laid down between Barking and Dagenham; alterations to Dagenham, Upminster and Pitsea stations will also be included in the scheme. Additional carriage sidings are to be constructed at Bow, Barking and Shoeburyness, and new loop lines at Victoria Park, Little Ilford, and Laindon, while the

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Locomotive Depôt at Shoeburyness is to be altered and extended to cope with the additional work.

* * *

On January 30 there was launched from the shipbuilding yard of John Brown & Co. Ltd., Clydebank, the twin-screw geared turbine steamer *Amsterdam,* which is being built to the order of the London & North Eastern Railway for Harwich-Hook of Holland service.

* * *

There was a crowded attendance of members of the G.W.R. (London) Lecture and Debating Society's meeting at Paddington station on Thursday, January 30. The lecturer was Mr. E. G. Matheson (Assistant Chief Engineer—Works and Structures), whose subject was "The Work of the Engineering Department." The company's Chief Engineer, Mr. R. Carpmael, presided.

* * *

In order to cater for local traffic, new G.W.R. halts have been opened at the under-mentioned places since the introduction of the winter train service on September 23: Monks Risborough and Whiteleaf, between Princes Risborough and Little Kimble; Blaisdon, between Grange Court and Longhope; Weston-under-Penyard, between Ross and Mitcheldean Road; Olmarch, between Pont Llanio and Llangybi; New Inn Bridge, between Rosebush and Puncheston; Martell Bridge, between Castlebythe and Beulah; Llandanwg, between Llanbedr-&-Pensarn and Harlech.

* * *

Two dredgers of special design, constructed by Messrs. Stothert & Pitt (Ltd.), of Bath, have been built for the Great Western Railway, and will be used on the Kennet and Avon Canal, more particularly on the section between Devizes and Newbury.

* * *

Gold leaf lining-out along the waistline, immediately below the windows, has been reintroduced on the latest passenger coaches of the Great Western Railway.

* * *

On a recent Tuesday an audience of 1,200 assembled in the Royal Hall at Harrogate, under the auspices of the Harrogate Literary Society, to hear a lecture by Mr. Cecil J. Allen, M.Inst.T., on "The Amazing Railways of the Alps." Over one hundred lantern slides and a striking cinema film illustrating the equipment and the planning of the St. Gotthard Railway were shown. The lecturer was introduced by Mr. F. E. Adams, the President of the Society. On Wednesday, January 22, a crowded audience gathered in the canteen of Messrs. Thornycroft's well-known Basingstoke works to hear a lecture by Mr. Cecil J. Allen on the "Modern Locomotive." The lecture was arranged by the Basingstoke Engineering Society.

* * *

The Annual General Meeting of the Transport Observation and Models Society was held at the Adelphi Hotel on January 15. Mr. S. M. W. Hann, of 7, Shirley Road, Croydon, was again elected secretary, but Mr. R. J. Westby, who had so ably fulfilled the duties of chairman for the past two years, did not seek re-election, but was unanimously elected a vice-president. Mr. H. E. Dear, who succeeds him, is to conclude the Winter Session, when he reads a paper on the London Omnibus on March 19, 1930. Mr. C. Baker was appointed business manager.

* * *

E. H. W. Gardner, writing from North Wales, suggests the following query: What train conveys two sets of through coaches from the same place, for the same destination, which travel by the same route throughout their journey, one of which, however, starts nearly two hours before the other?

* * *

Commenting upon Mr. R. R. J. Plummer's note on "Everyday Locomotives" in the February number, Mr. E. A. Gurney-Smith points out that L.M.S. "George V" engines are often used for important express trains on the North Wales main line, if not to and from London.

* * *

The following alterations of names of Southern Railway stations, &c., are announced: Bexhill, renamed Bexhill West; West Bexhill Halt, renamed Collington Halt; Bognor, renamed Bognor Regis; Brookwood, add "For Bisley Camp"; and Wanborough, renamed Wanborough for Normandy.

* * *

Mr. E. Scown will lecture to the Wimbledon and District Model Railway Club, at the Red Cross Hall, Church Road, Wimbledon, on March 17. Readers of *The Railway Magazine* are requested to write to the Hon. Secretary, 27, Bernard Gardens, S.W.19, for a copy of the Club circular, "About Ourselves."

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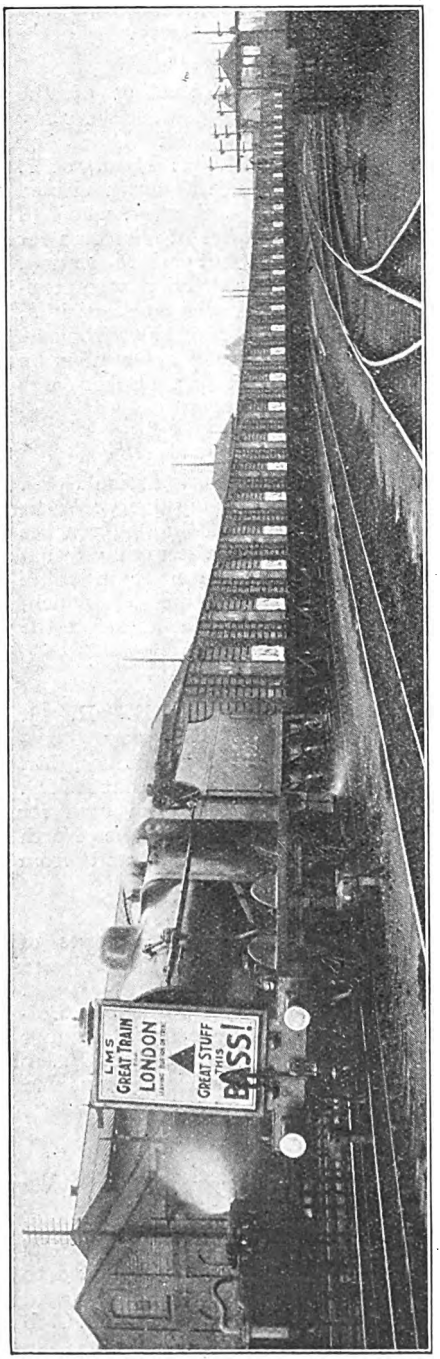
An improved pattern of insulated container for meat traffic between Liverpool and all parts of the L.N.E.R. system was recently inspected by representatives of the meat trade at Liverpool under the guidance of Mr. G. Leedam, L.N.E.R., District Goods Manager. These new containers are constructed on the lines of the L.N.E.R. refrigerator vans, with slab cork insulation between inner and outer sheeting boards. A door is fitted at either side and in one end. The containers, which are of 3 tons capacity, are carried on specially constructed flat wagons which allow of easy access to all doors.



TRAIN LOAD OF BEER FROM BURTON-ON-TRENT (BASS, RATCLIFF & GRETTON LIMITED) TO LONDON IN SPECIAL VANS FOR BEER TRAFFIC. A COMPLETE TRAIN IS DESPATCHED DAILY.

* * *

New facilities for railway travel in association with services by road have been introduced between London and Ipswich and London and Colchester. Holders of return tickets issued by the Eastern Counties Road Car Co. Ltd. may make the return journey in either direction by rail and travel by any train upon payment at the L.N.E.R. station booking office of a supplement.

* * *

The two Paris underground railways, the Metropolitan and the Nord-Sud, are being operated as one system as from January 1. There have for many years been close working relations between them.

* * *

The L.N.E.R. has withdrawn the passenger trains on the Selby and Cawood branch line. The branch railway is 5 miles in length.

* * *

The Southern Railway announces that it has been decided to have the promenade decks of the steamers *Dieppe, Newhaven* and *Rouen* closed in in the same way as was done to the *Paris* and *Versailles* last year. These shelter-decks are much appreciated by cross-Channel passengers. Another innovation on this service is the provision by the French State Railways of 1st, 2nd and 3rd-class couchettes between Dieppe and Paris (St. Lazare) and 1st-class couchettes between Dieppe and Paris (Lyon) on the night mail service. Arrangements have also been made for passengers to remain in their compartments on the train after arrival at St. Lazare until 7.30 a.m., if they so desire.

* * *

The L.N.E.R. has made arrangements so that, by giving previous notice, passengers may have special menus served in the restaurant cars and Pullman cars. Parties can suggest their own menus, and invalids, vegetarians and travellers on special diet may order special dishes. Football teams and other athletes will be provided with plain light meals on application.

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The Torquay Branch of the Great Western Railway.

By J. F. GAIRNS,
M.Inst.T., M.I. Loco.E.

(Photographs by the Author except as noted).

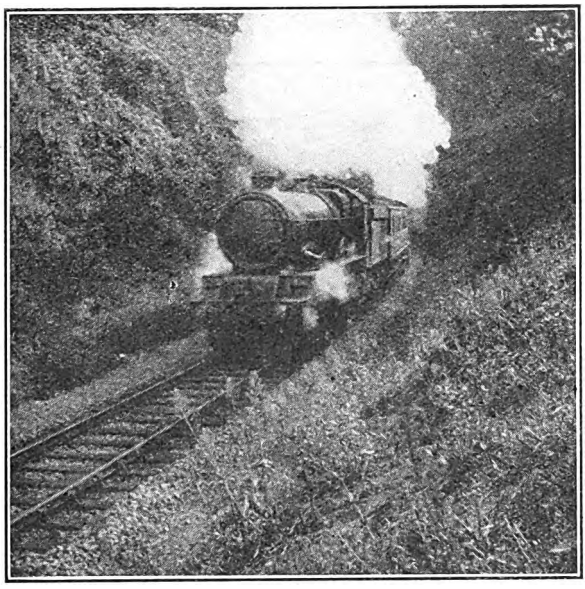

Photo.] [*H. L. Watkins.*

No. 6018 "KING HENRY VI" EMERGING FROM GREENWAY TUNNEL.

AMONG the many favourite holiday and residential resorts of the "West Country," Torquay takes a leading place. It is, indeed, often compared with the French and Italian Rivieras, and its beautiful gardens, rock walks, palm trees, cactus groves and wooded ravines, combined with the sweep of Torbay, where the blue seas and blue skies of poesy are often realities, go far to support such comparisons.

It is, moreover, an ideal place for invalids, though its chief appeal is to the hale and hearty, active and adventurous, in that one cannot do full justice to Torquay and district without spending a good deal of time in the immediate vicinity, visiting Babbacombe, Paignton, Dartmouth, Totnes, Brixham, &c., besides sampling Great Western Railway road motor trips, the River Dart steamers, and exploring the ravines, cliff walks, &c., within a radius of several miles. An important factor, too, is the notable train service which is provided by the Great Western Railway throughout the year, and very substantially amplified during the summer and at holiday times, not to mention the generous period and day excursion facilities which are available.

Torquay was a place of some importance in pre-railway days, and a branch designed to serve it was one of the first to be associated with the then South Devon Railway. The line from Aller Junction, about a mile beyond Newton Abbot, was, indeed, opened as far as Torre in 1849, only three years after the South Devon line was itself completed. Objection was, apparently, made to extending the line into Torquay itself, though this was not a very great drawback, as Torre is now part of Torquay and even then its station was reasonably convenient for many parts of the town, as well as being the station for Babbacombe.

At the end of 1860, however, the line was extended from Torre down to a point close to the shores of Torbay, on the western side of Torquay, and thence through Paignton to Churston Junction, whence a short branch line serves the fishing town of Brixham. In 1864 the line was further extended to Kingswear, whence a ferry service connects with

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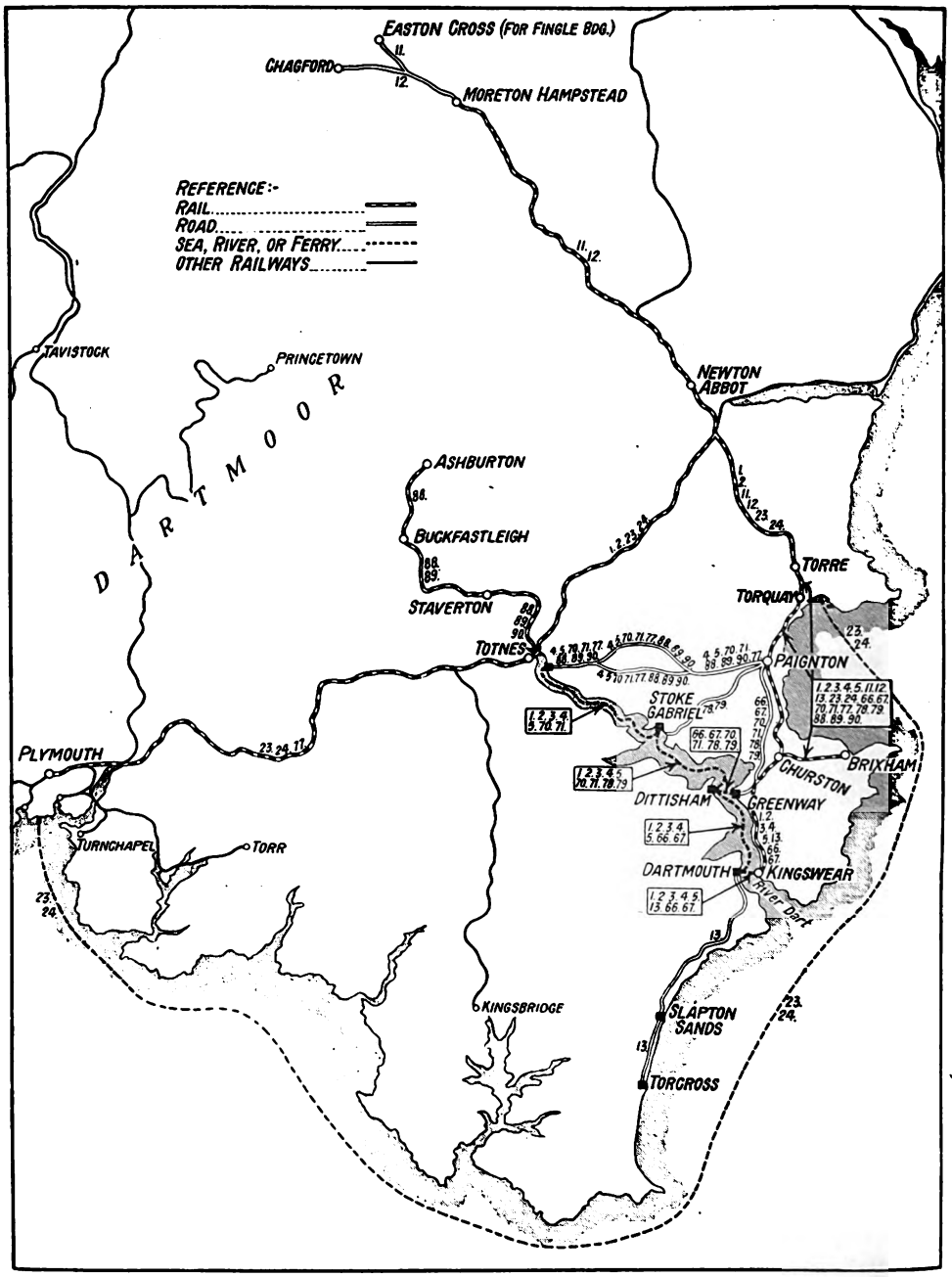

MAP OF TORQUAY DISTRICT SHOWING THE VARIOUS RIVER DART CIRCULAR AND OTHER TOURS.

(*For details see page* 264.)

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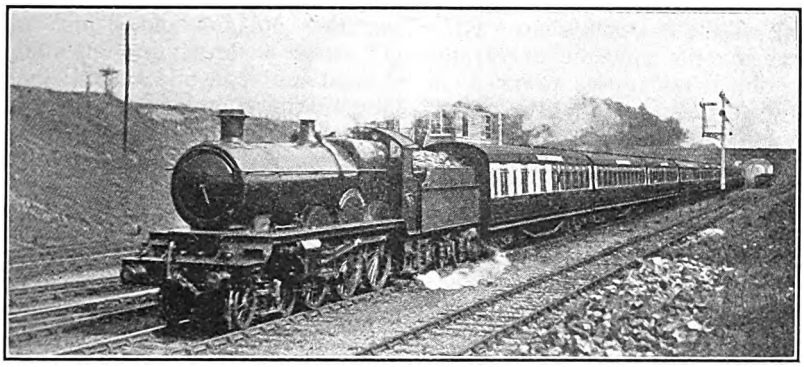

Photo.] DOWN "TORBAY LIMITED." [*H. Gordon Tidey.*
4-6-0 No. 4010 *Western Star.*

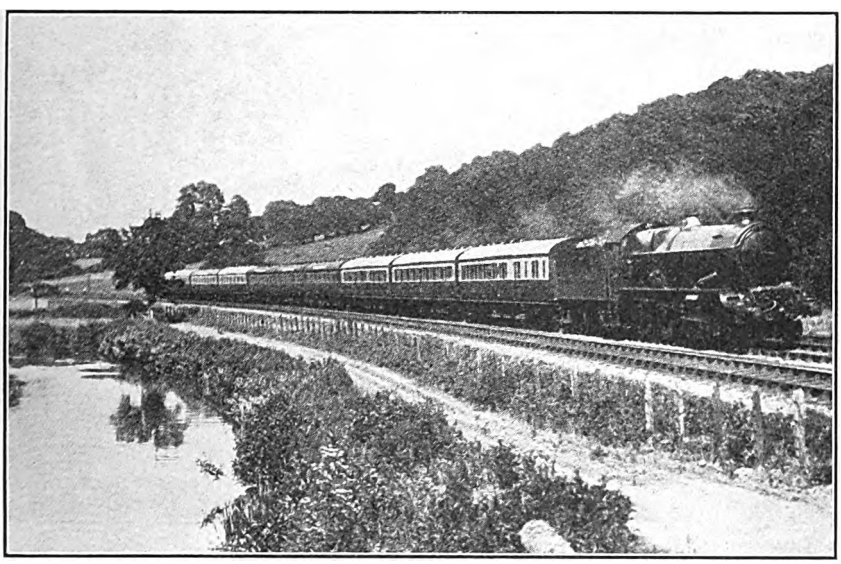

Photo.] DOWN "TORBAY LIMITED." [*D. R. Barber.*
4-6-0 No. 6009 *King Charles II.*

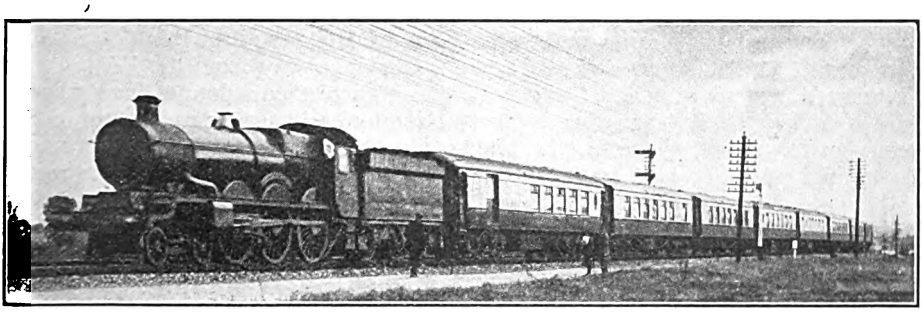

Photo.] UP "TORQUAY PULLMAN." [*D. R. Barber.*
Castle Class 4-6-0 Engine.

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Dartmouth, on the opposite shore of the Dart, this being the outcome of various schemes to obtain railway communication with the by no means unimportant town of Dartmouth, as an alternative to a branch from the main line at Totnes, not an easy proposition.

Although the Torquay branch leaves the main line at Aller Junction, the exchange station is Newton Abbot, one of the chief intermediate stations on the Great Western main line to the west, and where practically all trains call, except those which are complete in themselves for traffic beyond, towards Plymouth or through to the Torquay branch. The station has been recently reconstructed and now comprises two large and wide islands, each 1,370 ft. long, and adapted to accommodate two ordinary trains, or one of great length, on each face. One is reserved for down traffic, main line trains taking the inner face (platforms 3 and 4), while the outer face (Nos. 1 and 2) is generally used by branch or local trains, unless two main line trains are to interconnect. The up island similarly provides platform faces, Nos. 5 and 6 and 7 and 8, while there is an additional separate platform (No. 9) on the up side beyond the up through line which parallels Nos. 7 and 8 up main line. There is a down through line beyond Nos. 1 and 2, while beyond that, again, and on the London side of the station, are extensive carriage sidings, goods yard, engine shed, &c.

From the station to Aller Junction there are two down and two up main lines, so arranged that Torquay and Plymouth trains can leave the station simultaneously and two trains can arrive together, though in that case Plymouth trains usually take the outer line. Either line, as also any up or down platform or through line in the station, can be used for any train as convenient, the station connections and the layout at Aller Junction being now arranged to permit of this.

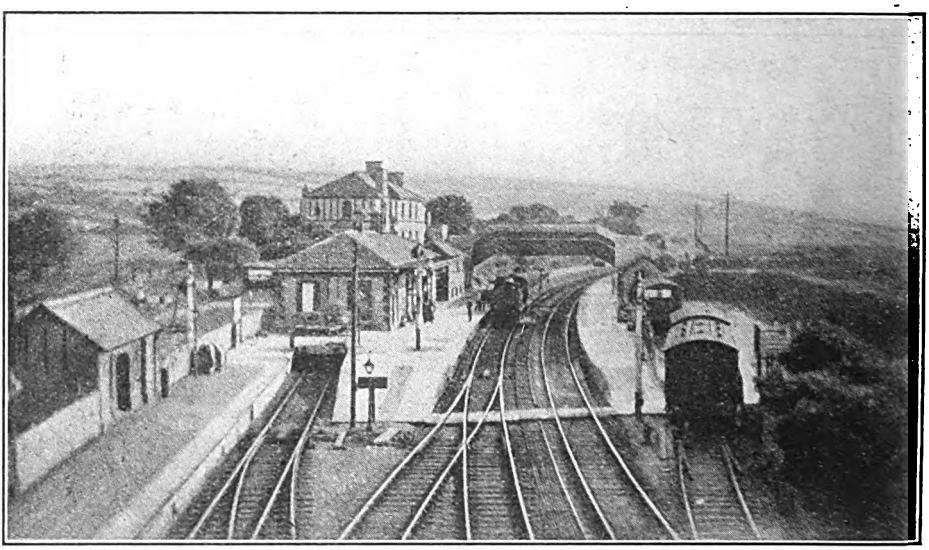

Photo.] CHURSTON JUNCTION, BRIXHAM BAY TO LEFT. [*A. R. Henwood.*

Curving away from the Plymouth line, the branch is now double track to beyond Paignton. Kingskerswell is an ordinary roadside station, as also is Torre, except that it has goods-shed accommodation, coal yard, &c., most of the goods traffic of Torquay being there handled. Onwards to Torquay one has pleasant views of attractive villas, pretty gardens and tree-shaded thoroughfares, with glimpses over the town and of the waters of Torbay and the cliffs which enclose it.

Torquay Station is neatly laid out,

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with platform gardens at the west end. There are two long main platforms with a middle siding, and a bay and carriage loading dock on the upside. Each platform has its own booking office, waiting rooms, refreshment rooms, &c., there being road access and cab yards on either side, though a footbridge and luggage hoist (with neat stone towers) connect the two platforms.

As already mentioned, the line is here close to the shores of Torbay, at the western end of the town, and convenient for many of the leading hotels and boarding houses, gardens, &c., and near to Torre Abbey and Livermead Sands, on either side of Corbyn Head.

The line continues in cutting, spanned by several road bridges, until it comes out alongside the main road, and gives views over Torbay and of the sands and rocks which fringe its shores. It is then crossed by the main road, and after passing the gas works and electric power station, Paignton is reached. This is now quite a big place, with gardens, beach attractions, &c., and receives large numbers of summer visitors. The station is on the level, and there is, therefore, a busy road crossing. It has a few carriage sidings, as some of the trains do not proceed further. Several Great Western Railway road motor services operate from the station yard.

Passing Paignton Station the line remains double-track as far as Goodrington Box, but is single beyond. The halt of this name serves Goodrington Sands, a good view of which is had as the journey is continued. After passing Broad Sands, immediately beyond, however, the line turns inwards to Churston Junction. Here the branch from Brixham comes in, there being a short terminal platform on the down side, where the branch train usually stands to take passengers from trains on the through lines, though, if unoccupied, the Brixham local trains are dealt with in the main station. This branch is about two miles long, and beyond its terminal platform is extended on to a jetty to enable the considerable volume of fish traffic to be conveniently dealt with. There are also a number of sidings in the goods and fish yards.

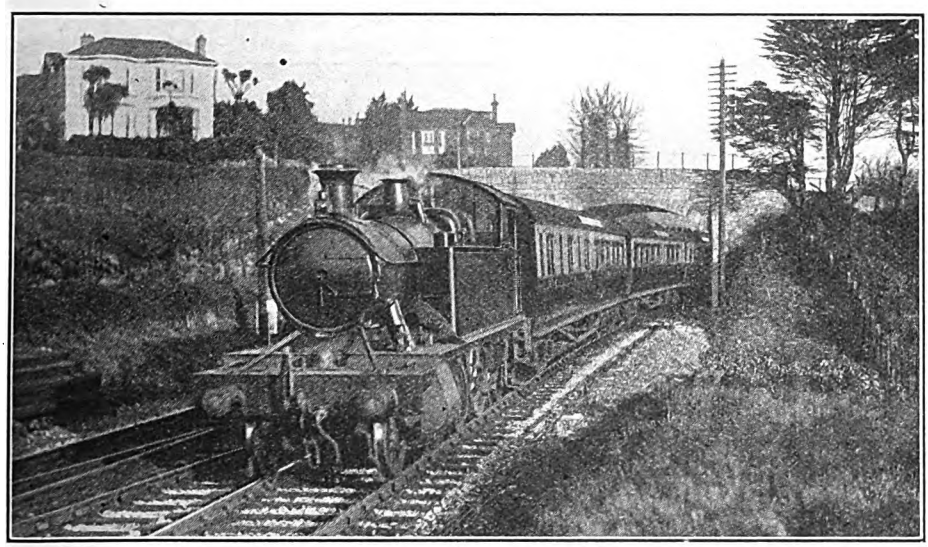

Photo.] [*H. Gordon Tidey.*

EMPTIES FOR UP "TORBAY LIMITED" APPROACHING PAIGNTON.

Leaving Churston Junction the Kingswear line continues in cutting, with fairly stiff gradients up to Greenway tunnel (489 yds. long, single line). By this time, however, the peninsula between Torbay and the estuary of the Dart has been crossed, and, even before the tunnel is reached, passing glimpses are had of the beautiful waters of that river. It is,

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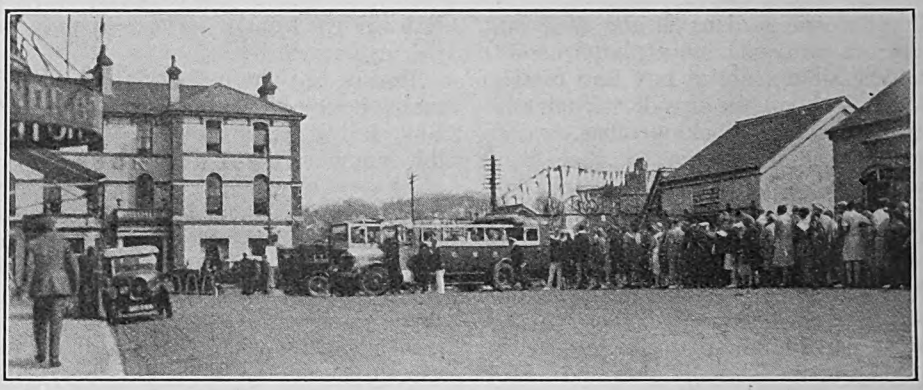


WAITING FOR G.W.R. BUSES FOR DART CIRCULAR TOUR AT PAIGNTON STATION.

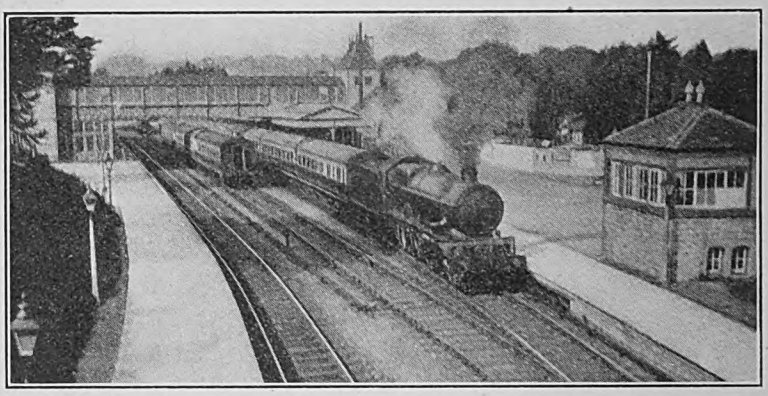
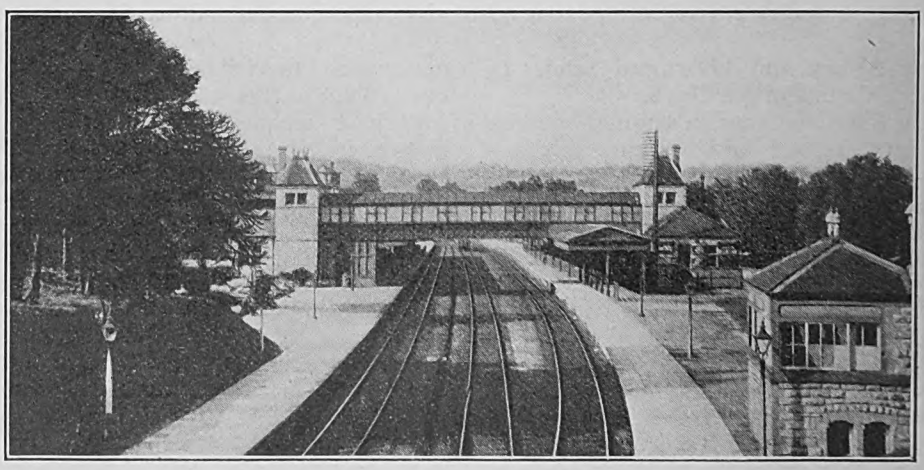


Photo.] [*L. G. Hubback.*

ARRIVAL OF "TORBAY LIMITED" AT TORQUAY.
4-6-0 No. 6007 "King William III."



GENERAL VIEW OF TORQUAY STATION.

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however, beyond the tunnel that the principal views of the Dart are had, and until the line comes out directly on its banks. A side water is here crossed by an arched viaduct of considerable height, after which the line descends alongside the river, past a shipbuilding yard, until it reaches the busy goods yard adjacent to Kingswear Station, with its coal jetty and small harbour used by local craft when transhipping to or from rail.

The station consists of one double-sided platform, from which a covered way leads down to the railway pier, whence the Great Western Railway ferry steamer, *The Mew,* plies across the river to the comparatively busy town of Dartmouth on the opposite bank. Here, another pier is provided and equipped with railway booking office, &c., tickets being issued as in the case of a true railway station. As expressed by Mr. Edmond F. Ball, who described Dartmouth as a "Curious Railway Station" in the September, 1901, issue of the RAILWAY MAGAZINE, "the inhabitants of the Borough of Clifton—Dartmouth—Hardness, as the town is styled, have to get their tickets on one side of the river and get into the train on the other side; or, in other words, 'book' in one town and 'board' in the next." Dartmouth is, incidentally, an important naval training depôt, and a training ship is stationed there. There is also the Naval College.

A notable feature of the Torquay express-train services is the extent to which through carriages, and even complete trains, are provided, apart from, or in conjunction with, the special London facilities. Thus, there is one through train each way *via* Bristol and the London Midland and Scottish Railway for Bradford, Leeds, Sheffield and Derby passengers, four *via* Crewe serving Shrewsbury, Manchester and Liverpool, with two for Birmingham and Wolverhampton, apart from numerous easy and convenient connections.

From London (Paddington) the special through services (summer) are:—

9.0 a.m. via Westbury—
Torquay arr. 1.48 p.m. Through to Paignton and Kingswear and for Dartmouth.

11.0 a.m. Torquay Pullman Limited, via Westbury.
Torquay arrive 2.40 p.m. Through to Paignton, with connections to Kingswear and Dartmouth.

12.0 noon "Torbay Limited" Express via Westbury. Non-stop to Torquay, arr. 3.30 p.m. Through to Paignton and Kingswear and for Dartmouth.

1.30 p.m. via Westbury—
Torquay arr. 6.12 p.m. Through to Paignton and Kingswear and for Dartmouth.

3.30 p.m. via Westbury—
Non-stop to Exeter. Torquay arr. 7.28 p.m. Through to Paignton.

4.30 p.m. via Bristol—
Torquay arr. 9.43 p.m. Through to Paignton and Kingswear and for Dartmouth.

6.30 p.m. via Bristol—
Torquay arr. 11.49 p.m. Through to Paignton.

Where the trains are not through to Kingswear, with ferry services to Dartmouth, there is usually a through service a few minutes later. Torquay can also be reached, with usually one change only (at Newton Abbot), by the 12 midnight Sleeping Car train, 5.30 a.m., 7.15 a.m. and 12.5 p.m. trains from Paddington, but, as a rule, there is little to be gained by using any of these, except the midnight train, as their chief value is for intermediate stations.

On Sundays the 10.30 a.m. "Cornish Riviera" express serves Torquay (due 2.44 p.m.), with the 2.30 p.m. (due 7.24 p.m.), and the 4.30 p.m. (due 9.52 p.m.).

In the up direction the through London services are:—

Torquay depart—

8.45 a.m. From Dartmouth, Kingswear and Paignton. Transferred at Exeter to 8.35 a.m. train from Plymouth, Paddington arr. 1.15 p.m.

10.15 (S.O.) a.m. Starts from Churston. Non-stop to Paddington, due 1.55 p.m.

12.0 noon "Torbay Limited" Express. Non-stop to Paddington, due 3.35 p.m. From Torquay only on Saturdays, other days also Dartmouth, Kingswear and Paignton passengers.

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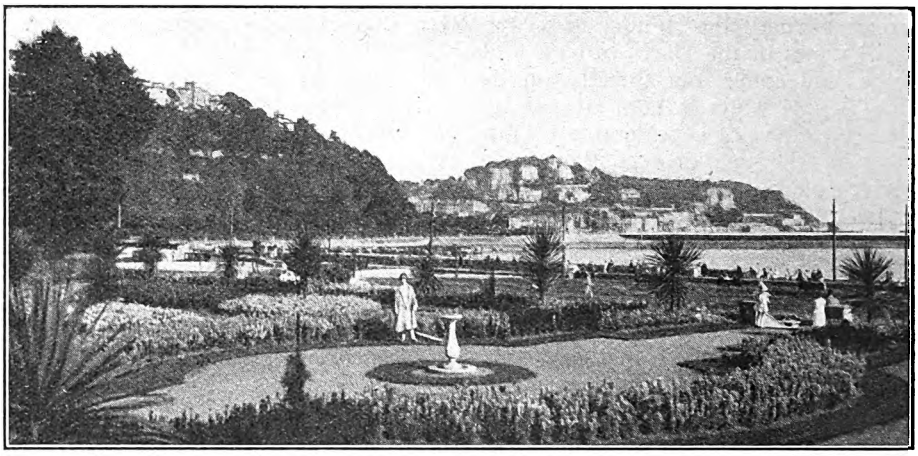
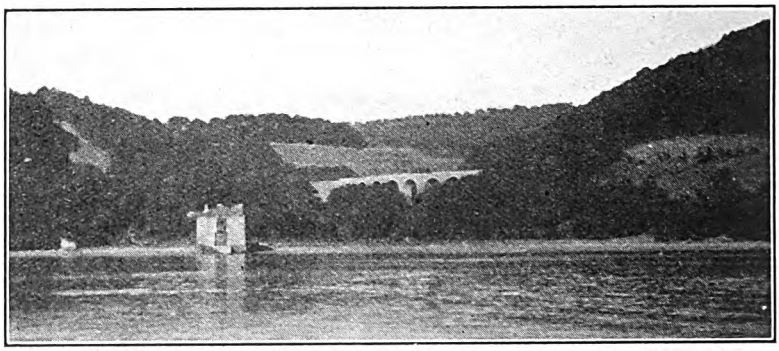
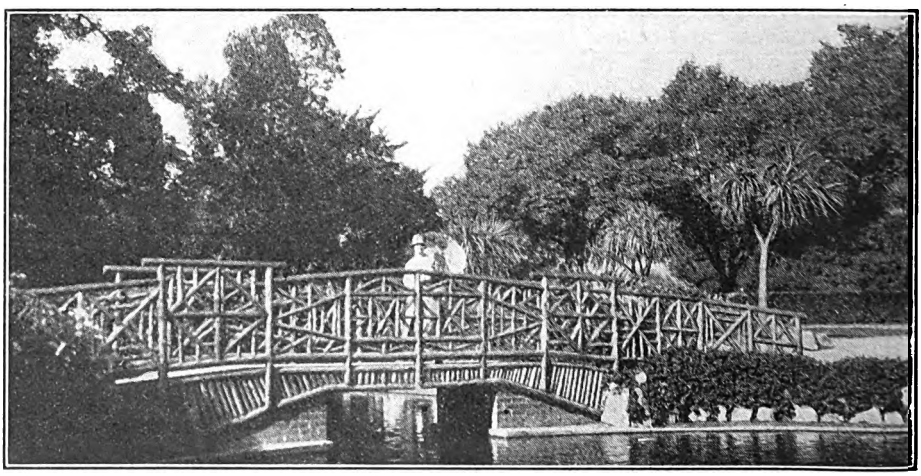


IN ABBEY PARK GARDENS, TORQUAY.



VIADUCT BETWEEN GREENWAY TUNNEL AND KINGSWEAR. RIVER DART IN THE FOREGROUND.



IN THE KING'S GARDENS, TORQUAY.

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12.10 (S.O.) p.m. From Kingswear (and Dartmouth) and Paignton. Non-stop to Paddington, due 3.50 p.m.

2.35 (N.S.) p.m. Starts from Paignton. Due Paddington, 6.55 p.m.

2.53 (S.O.) p.m. Starts from Paignton Due Paddington 7.10 p.m.

4.38 p.m. (starts from Paignton 4.30 p.m.). Torquay Pullman, Limited. Due Paddington 8.30 p.m.

4.43 p.m. Starts from Paignton. Due Paddington 9.0 p.m.

Other services are those from Torquay at 7.45 a.m. (Mondays only), 12.18 p.m. and 12.42 a.m. (night service, due Paddington, 7.10 a.m.). On Sundays the services from Torquay are 10.50 a.m., 2.25 p.m., 3.0 p.m., 5.5 p.m., 8.39 p.m. and 11.6 p.m.

A few notes must now be given in regard to services between Torquay and Birmingham, Liverpool, Manchester, Leeds, Bradford, &c. Dealing first with the Wolverhampton and Birmingham trains, the 7.15 a.m. from Wolverhampton (7.55 from Birmingham (Snow Hill)) travels *via* Stratford-on-Avon and Cheltenham Spa to Bristol, connecting there with a train from Bath, due at Torquay at 1.17 p.m. On Saturdays the train gives a through service to Torquay and Paignton, calling at Stapleton Road and not Temple Meads in Bristol, and reaching Torquay at 12.52 p.m. The 9.30 a.m. Wolverhampton (9.45 a.m. Birmingham) takes the same route *via* Temple Meads, Bristol (except on Saturdays), and Torquay is reached at 2.15 p.m. The 10.40 a.m. Wolverhampton (11.20 a.m. Birmingham) also serves Stratford-on-Avon and Cheltenham Spa, running through to Exeter and reaching Torquay at 4.36 p.m.

The return train leaves Torquay at 11.0 a.m., and on Saturdays runs through from Exeter to Cheltenham Spa, reaching Birmingham at 4.24 p.m. and Wolverhampton at 5.10 p.m., whereas on other days Bristol (Temple Meads) is served, and the final arrivals are 4.40 and 5.10 p.m., respectively. The 1.15 p.m. on Saturdays also avoids Bristol, running non-stop from Taunton to Cheltenham Spa, and reaches Birmingham at 6.30 p.m. and Wolverhampton at 7.0 p.m. On other days the 1.40 p.m. gives similar facilities, serving Bristol *en route,* and reaching destination stations half an hour later.

Via the London Midland and Scottish Railway and the Shrewsbury and Hereford Joint Line, the 9.10 a.m. from Liverpool (Lime Street) takes also the through coaches from Manchester (London Road) at 9.25 a.m., except on Saturdays, and Torquay is reached, *via* Crewe, Shrewsbury and Hereford, at 5.38 p.m. On Saturdays, however, this service brings the Liverpool coaches only, and Manchester (London Road) has, first, the 9.25 a.m. service as a separate train, omitting Crewe and running ahead of the Liverpool train, also avoiding Bristol, and reaching Torquay at 4.36 p.m. ; and, second, the 10.35 a.m. from London Road, also passing Crewe and avoiding Bristol, due at Torquay at 5.10 p.m.

Next there is the ordinary 10.40 a.m. from Manchester (London Road), connecting with the 10.35 a.m. from Liverpool to Plymouth, due at Torquay at 6.48 p.m. Then comes the 12.0 noon from Liverpool (Lime Street), connecting with the 12.0 noon from Manchester (London Road), and due at Torquay at 9.43 p.m. These trains, of course, have a wide range of connections, not only in the Crewe and Shrewsbury area, but also at Hereford and Newport (if calling), so that their usefulness is actually very extensive. There are also, on Fridays, through carriages for Torquay on the 11.55 p.m. from Manchester (London Road), due Torquay 8.26 a.m. The return services from Torquay are 7.33 a.m. for Liverpool and Manchester, and 9.25 (9.10 on Saturdays), 10.35 a.m. and 12.52 (not Saturdays) and 1.15 (Saturdays only) p.m. for Manchester (London Road) and Liverpool (Lime Street).

In connection with the Midland Division of the London Midland and Scottish Railway *via* Bristol (Temple Meads), the special through service, north to west, is that leaving Bradford at 10.12 a.m. ; Leeds, 10.45 a.m. ; Sheffield, 11.42 a.m. ; and Derby, 12.35 (Fridays and Saturdays excepted) and 12.42 (Fridays and Saturdays only) p.m. Torquay is reached at 6.32 p.m. (Fridays and Saturdays only) and 6.48 p.m. (Fridays and

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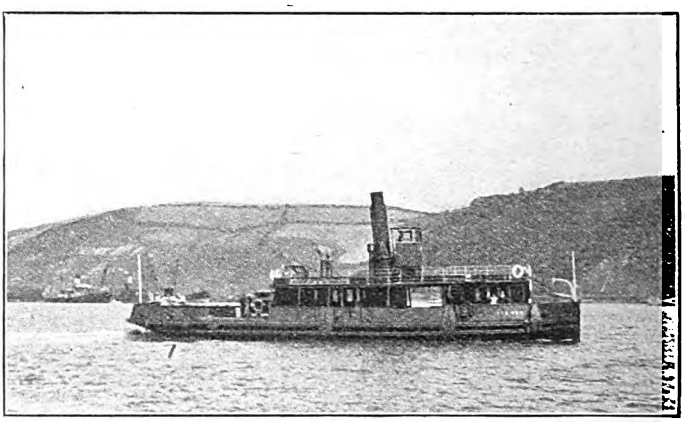
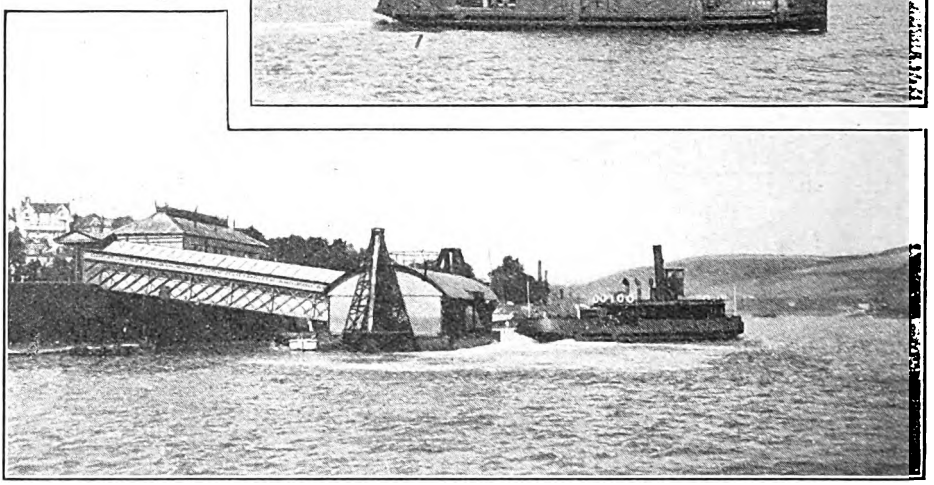
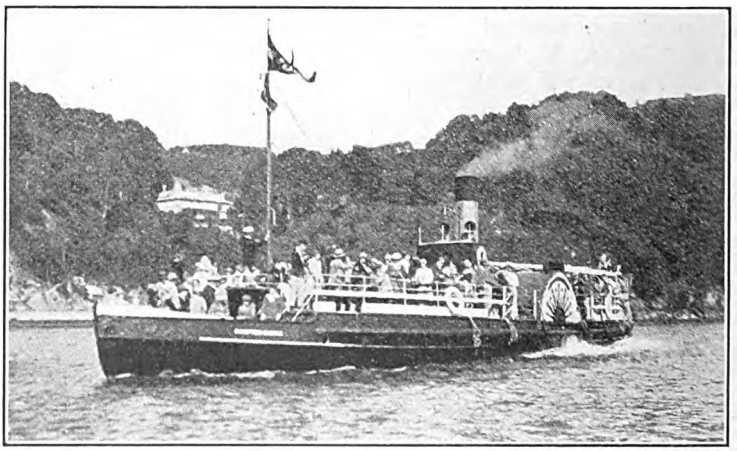
"THE MEW" KINGSWEAR—DARTMOUTH FERRY SERVICE.





"THE MEW" LEAVING DARTMOUTH "STATION."



RIVER DART STEAMER "COMPTON CASTLE."

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Saturdays excepted). The return train leaves Torquay at 9.35 a.m.

From South Wales there is a train from Carmarthen at 8.5 a.m., serving Swansea (9.40 a.m.), Cardiff (11.25 a.m.) and Newport (11.47 a.m.), for Torquay and Paignton, which omits Bristol on Saturdays. In many cases, too, through carriages from Glasgow, Edinburgh, Aberdeen and various towns in England to Penzance or Plymouth call at Newton Abbot, thus involving one change only if used by Torquay passengers. There are, further, trains between Bristol or Exeter and Torquay, while Reading gets some of the through London trains, some of which travel *via* Bath and Bristol.

The general result is that in summer the Torquay line has quite a long series of through trains of one kind or another, and the service is further amplified by local trains, so that the route is quite a busy one, with a train frequency equal to that of many a city suburban service. There are, in fact, 21 trains which work right through between Newton Abbot and Kingswear, all with boat connections across to Dartmouth, and about the same number, according to the day of the week, terminating at Paignton. There is also an early morning connection to Torre with the 9.50 p.m. sleeping-car train from Paddington, mainly for mail and parcels traffic. There is a more or less equivalent return service. Connections are given on Fridays with the regular period excursions from and to Paddington, these being third class only. The Brixham branch is worked by a motor train, running to and fro and making about 20 trips during the day to connect with the Kingswear trains.

On Sundays there are 7 trains each way through from Newton Abbot to Kingswear, 13 to Paignton and 5 to Churston. The Brixham branch has 7 trains each way. An interesting innovation started in 1928 was a through Sunday service, in conjunction with the Southern Railway *via* Exeter, between Ilfracombe and Torquay. One train leaves Ilfracombe at 9.15 a.m. and reaches Torquay at 12.26 p.m., and the other leaves Ilfracombe at 6.15 p.m., due Torquay 9.21 p.m. In the reverse direction trains leave Torquay at 9.17 a.m. and 6.52 p.m., reaching Ilfracombe at 12.40 p.m. and 10.14 p.m., respectively. The trains enable visitors to either place to make Sunday trips to the other.

While, however, the Torquay branch has so generous local services and is splendidly served by fast expresses from and to London (some of them among the fastest and most notable operated by the Great Western Railway), with the through services to and from various parts of the country, it is also an important centre for Western National motor-omnibus services. These are all centred on Paignton, but in most cases combined rail and road fares are in operation, so that Torquay visitors can use them quite easily. A number are, in fact, concerned in the various round tours (rail, road and steamer), to which reference is made later.

One service from Paignton is *via* Churston and Galmpton to Greenway (ferry to Dittisham across the Dart), 7 services weekdays, each way (and one which "does not run on Saturdays or during School Vacations"), and 5 on Sundays. There are no fewer than 31 weekday services between Paignton and Totnes (5 *via* Berry Pomeroy, the remainder *via* Beechdown and Longcombe), and 18 on Sundays (2 *via* Berry Pomeroy). There are also four services on weekdays between Totnes and Churston and Brixham. From Dartmouth there are services to Torcross, Kingsbridge, Modbury, Yealmpton and Plymouth, or on sections of the through route, while Newton Abbot has services to Totnes and beyond, besides some on Sundays to Torquay in connection with trains.

One of the great attractions for all Torquay district visitors is, however, the series of combined rail, road and river circular tours in operation. These can be made practically as convenient and by any service on the route, and in most cases fares covering first-class travel on the rail sections are available, as well as third. Not infrequently, it is necessary to run a number of motor coaches for the road sections, but, as noted by the writer, even although queues may have to be formed at Paignton or Totnes, there is always a series of motor coaches in waiting, or going off, one after another, as

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TOUR No. 1.
Rail to Totnes.
River Dart Steamer Totnes to Dartmouth.
Home by Rail from Dartmouth.

TOUR No. 2.
Rail to Dartmouth.
River Dart Steamer Dartmouth to Totnes.
Home by Rail from Totnes.

TOUR No. 3.
Rail to Dartmouth.
River Dart Steamer Dartmouth to Totnes and
Home by Rail from Dartmouth.

TOUR No. 4.
Rail to Paignton.
G.W.R. Road Motor Paignton to Totnes.
River Dart Steamer Totnes to Dartmouth.
Home by Rail from Dartmouth.

TOUR No. 4a.
Evening River Dart Tour from Paignton.

TOUR No. 5.
Rail to Dartmouth.
River Dart Steamer Dartmouth to Totnes.
G.W.R. Road Motor Totnes to Paignton.
Home by Rail from Paignton.

TOUR No. 11.
Rail to Moretonhampstead.
G.W.R. Road Motor to Eaton Cross (for Fingle Bridge) and back.
Home by Rail from Moretonhampstead.

TOUR No. 12.
Rail to Moretonhampstead.
G.W.R. Road Motor to Chagford and back.
Home by Rail from Moretonhampstead.

TOUR No. 13.
Rail to Dartmouth.
G.W.R. Road Motor Dartmouth to Stapton Sands or Torcross and back.
Home by Rail from Dartmouth.

TOUR No. 23.(*).
Rail to Torquay.
Steamer Torquay to Plymouth.
Home by Rail from Plymouth.

TOUR No. 24. (†)
Rail to Plymouth.
Steamer Plymouth to Torquay.
Home by Rail from Torquay.

TOUR No. 66.
Rail to Paignton.
G.W.R. Road Motor Paignton to Greenway.
Ferry Greenway to Dittisham.
River Dart Steamer Dittisham to Dartmouth.
Home by Rail from Dartmouth.

TOUR No. 67.
Rail to Dartmouth.
River Dart Steamer Dartmouth to Dittisham.
Ferry Dittisham to Greenway.
G.W.R. Road Motor Greenway to Paignton.
Home by Rail from Paignton.

TOUR No. 70.
Rail to Paignton.
G.W.R. Road Motor Paignton to Totnes.
River Dart Steamer Totnes to Dittisham.
Ferry Dittisham to Greenway.
G.W.R. Road Motor Greenway to Paignton.
Home by Rail from Paignton.

TOUR No. 71.
Rail to Paignton.
G.W.R. Road Motor Paignton to Greenway.
Ferry Greenway to Dittisham.
River Dart Steamer Dittisham to Totnes.
G.W.R. Road Motor Totnes to Paignton.
Home by Rail from Paignton.

TOUR No. 77.
Rail to Paignton.
G.W.R. Road Motor Paignton to Totnes.
Rail Totnes to Plymouth and back.
G.W.R. Road Motor Totnes to Paignton.
Home by Rail from Paignton.

TOUR No. 78.
G.W.R. Road Motor, Paignton to Stoke Gabriel.
River Dart Steamer, Stoke Gabriel Pontoon to Dittisham.
Ferry, Dittisham to Greenway.
G.W.R. Road Motor, Greenway to Paignton.

TOUR No. 79.
G.W.R. Road Motor Paignton to Greenway.
Ferry Greenway to Dittisham.
River Dart Steamer Dittisham to Stoke Gabriel Pontoon.
G.W.R. Road Motor, Stoke Gabriel to Paignton.

TOUR No. 88.
Rail to Paignton.
G.W.R. Road Motor Paignton to Totnes.
Rail Totnes to Ashburton and back.
G.W.R. Road Motor Totnes to Paignton.
Home by Rail from Paignton.

TOUR No. 89.
Rail to Paignton.
G.W.R. Road Motor Paignton to Totnes.
Rail Totnes to Buckfastleigh and back.
G.W.R. Road Motor Totnes to Paignton.
Home by Rail from Paignton.

TOUR No. 90.
Rail to Paignton.
G.W.R. Road Motor Paignton to Totnes.
Rail Totnes to Staverton and back.
G.W.R. Road Motor Totnes to Paignton.
Home by Rail from Paignton.

* Tuesdays, Wednesdays and Thursdays only.
† Tuesdays and Thursdays only.
Certain of these tours do not apply throughout the Summer Season. First Class Fares on Rail Sections also available.

G.W.R. RAIL, ROAD, RIVER AND SEA TOURS IN THE TORQUAY DISTRICT (SUMMER).

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loaded, so that there is never any undue delay. With variations of starting point and reverse directions, the principal tours are set forth on page 264 and shown on the map on page 254. The following are the third-class fares from Torquay for each as numbered:—1 and 2, 3s. 2d. ; 3, 3s. 9d. ; 4 and 5, 3s. 3d. ; 11, 3s. 1d. ; 12, 3s. 4d. ; 13, 4s. ; 23 and 24, 6s. 6d. ; 66 and 67, 2s. 3d. ; 70 and 71, 2s. 9d. ; 77, 4s. 3d. ; 88, 2s. 7d. ; 89, 2s. 3d. ; 90, 1s. 10d. Every one of these can be cordially recommended, a recommendation which is fully supported by the extent to which they are favoured throughout the holiday season. There are also many half-day rail facilities and day excursion trips, so that the holiday visitor to the Torquay district is exceptionally well favoured.

AN L.M.S. VETERAN IN SCOTLAND.

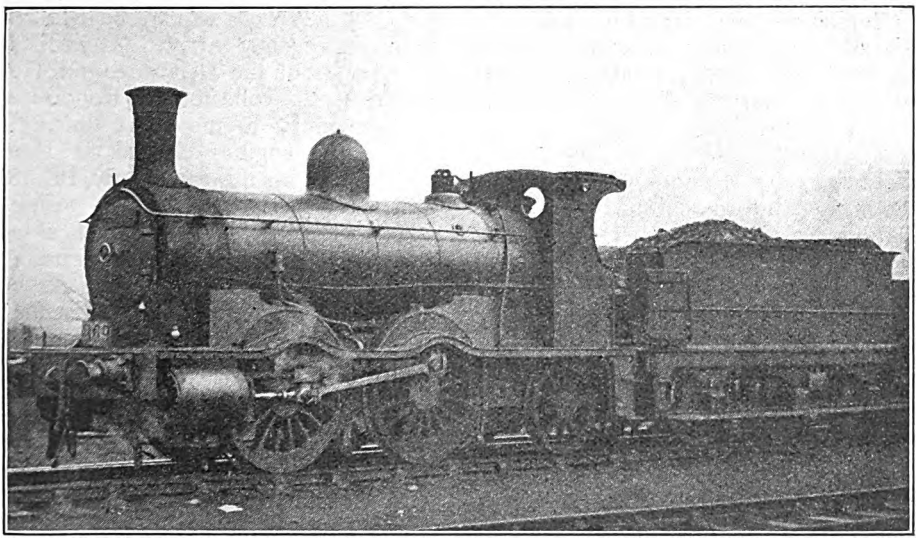

Photo.] [*J. D. Sherriffs.*

LONDON MIDLAND & SCOTTISH RAILWAY (CALEDONIAN SECTION).

This photograph, taken at Hamilton, shows one of the last survivors of a once numerous 0-4-2 class of the Caledonian Railway. No. 17003 (formerly 1253), along with her sister engine 17002 (formerly 1676), is regularly engaged in shunting duties at Hamilton Central Station. These locomotives bear a maker's plate dated 1879. Another of the class, No. 17013 (formerly 279), is engaged on the Balerno Branch, and 17007 (formerly 1674) is at Dundee West.

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Early British Locomotives in U.S.A.

By W. E. S. BROWN.

TWELVE miles south-west of Birmingham, on the south bank of the River Stour, is situated the market town of Stourbridge. Here was built one of the first locomotives to run on an American railroad, though not the first to arrive in the United States. Early in 1828 the directors of the Delaware and Hudson Canal Company, being aware of the success of the Stockton and Darlington line, sent a prominent American engineer, Mr. Horatio Allen, to England to purchase locomotives and rails. Mr. Allen ordered one locomotive from Foster, Rastrick & Co., of Stourbridge, and two others from R. Stephenson & Co., the first to arrive in New York being the *America,* built by the latter firm. She was shipped aboard the *Columbia,* arriving at her destination on January 15, 1829, the second Stephenson engine following in September of the same year. The *Stourbridge Lion,* Foster, Rastrick & Co.'s engine, was shipped aboard the steamer *John Jay* on April 8, 1829, arriving in New York on May 17, and was, therefore, the second locomotive to be seen in America. The *America* was set up in the yard of the firm of Abeel and Dunscomb, in Water Street, New York, and supported on blocks so that her machinery could be put in motion whilst she herself remained stationary. This was on May 27, 1829, anthracite coal being used and the machinery kept running for hours, "to the great satisfaction of the assembled spectators." The *Stourbridge Lion* was assembled by Allen himself in Kemble's manufactory, and run upon a testing stand there to the great edification of scientific persons, the test lasting for several days. The editor of a New York newspaper then current, the *Courier and Inquirer,* was one of those who were present at both these exhibitions, and in the issue of his paper for May 29, 1829, thus referred to them: "We yesterday attended the first exhibition of a locomotive engine called *The Lion,* imported by the Delaware and Hudson Co. to use upon their railroad. On Wednesday (the 27th) the engine first imported (Stephenson's engine) was tried, and gave such satisfaction that the present exhibition was enormously attended by gentlemen of science and practical intelligence." The two locomotives remained in New York until early in July, when they were sent to Rondout, N.Y., the eastern end of the Delaware and Hudson canal, arriving there on July 4, and on July 16 they were sent by boat to Honesdale where they arrived a week later. The books of the Delaware and Hudson Canal Co.'s collector at Rondout contain an entry to the effect that, "Two locomotive engines cleared at Rondout and started up the canal July 16, 1829." On arrival at Honesdale they were taken out of the boats and placed alongside the track, remaining there pending the completion of the road. On August 8, 1829, everything was ready for the trial trip, and, for some unexplained reason, the *Stourbridge Lion* was selected for the first run. As a result of this trial, Mr. Jervis, the chief engineer of the road, decided that the construction of the road, as regarded the curved portions, was unsafe for the running of a steam locomotive. The rails were of wood, with strap iron top pieces, these being insufficient to support the engine's weight, and although the locomotive gave entire satisfaction, it was thought unadvisable to construct a railroad to suit the engine. The minute book of the directors of the Delaware and Hudson Canal Co., under date of August 13, 1829, contains the following record: "Upon presentation of J. B. Jervis, Esq., the chief engineer of the company, that the experiment made that a locomotive engine on the railroad had shown that the iron plates were not fastened sufficiently firm on the wooden rails to resist the pressure of the engine on the curved parts of the road, and the consequence was that the iron plates were pressed from their places so much that the engine could not be used until the fastening shall be made more

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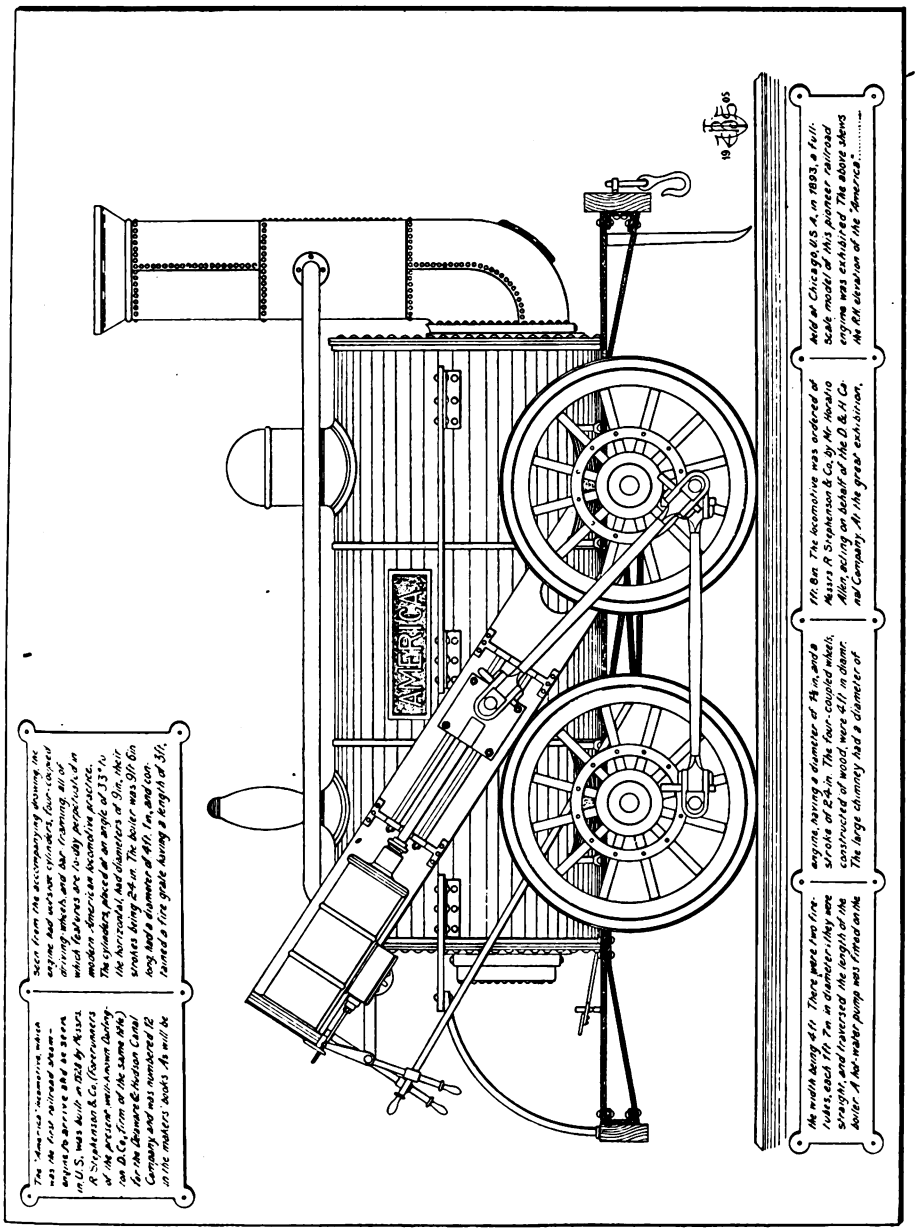

THE "AMERICA," BUILT BY R. STEPHENSON & CO. IN 1828.

Drawing by W. E. S. Brown.

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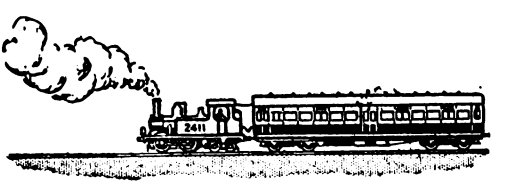
perfect ; and that he conceived that the only means by which coal can be brought to market this fall will be by making a horse path, so that the animal power may be used in place of the locomotive engines, and it is resolved that the chief engineer be, and he hereby is, authorised and instructed to proceed forthwith and have a horse path made along the whole of that part of the railroad upon which the locomotive engines were to have been used." The *Stourbridge Lion* was taken off the track and a temporary roof built over it, in which state it remained for fifteen years, during which time it was slowly dismantled, as needs of the nearby shops made use of the different parts. It was then removed to the Honesdale foundry, then owned by Gilbert Knapp, and taken to pieces, the boiler and other large iron parts going to the Carbondale shops, one of the cylinders being there used to drive lathes. At the Railway Appliances Exhibition, held in Chicago in 1883, this boiler was shown, and is now in the National Museum, Washington. As a result of the trial the *America* was never put on the track but was put on the ground alongside the canal, remaining there for several months. It is uncertain what afterwards became of it, but it is believed that the Canal Company sold it some years after the trial, and that it was taken to Carbondale and used as a stationary engine in a manufactory there. What became of the second Stephenson engine appears to be unknown. In 1905, the Smithsonian Institution, Washington, collected such existing parts of the *Stourbridge Lion* as could be found, these consisting of the boiler, one cylinder, two walking-beams, the rims of the wheels and a few minor fittings. A model showing the engine's original construction was made, and can be seen in the Institution.* The *Stourbridge Lion* was a four-wheeled engine, these being coupled by rods to act as drivers as well as carriers, the cylinders being vertical, placed at the back and each side of the firebox, with "grasshopper" beams and connecting-rods from them to the coupling-rods of the four wheels. The boiler was cylindrical, there being no drop firebox, and the smokebox had painted on it a lion's head, very well executed. The front end of the beams were supported by a pair of radius rods, which formed a parallel motion. Weight of engine, 7 tons ; horse-power 9 ; speed, 5 m.p.h. ; stroke of cylinders, 2 ft. It may be mentioned that Foster and Rastrick built an engine called the *Agenoria* in 1829, which can be seen in the South Kensington Museum. It is identical in general design with the *Stourbridge Lion*. The *America* was also a four-wheeled engine, but had cylinders inclined to the horizontal at an angle of 33°, they being 9 in. in diameter, with a stroke of 2 ft. The boiler was cylindrical, with two firetubes, 1 ft. 7 in. diameter each, the boiler itself being 9 ft. 6 in. long and having a diameter of 4 ft. 1 in. The coupled wheels were 4 ft. in diameter and of wood.

* A photograph of this model appears on page 328 of THE RAILWAY MAGAZINE for October, 1929.



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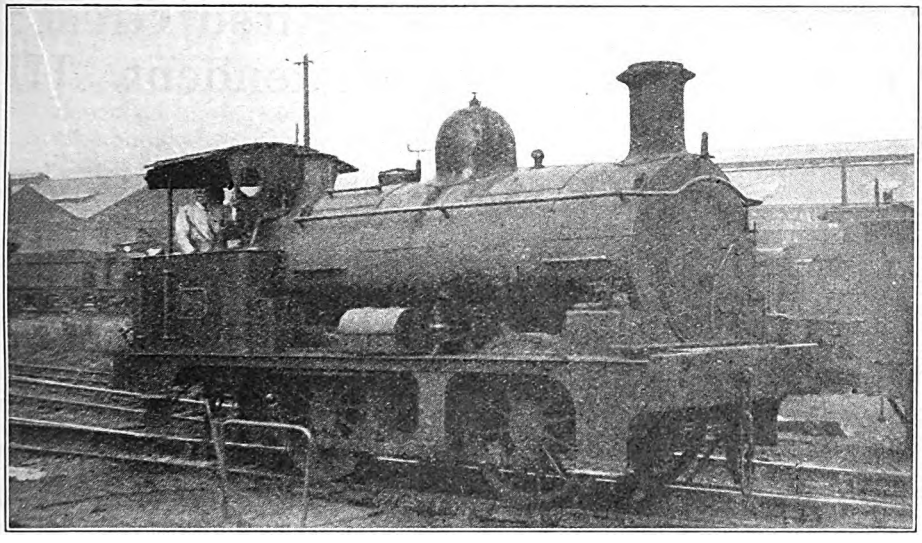

Photo.] [*F. W. Hutton-Stott.*

G.W.R. 0-4-0T Locomotive No. 96.

By CAPT. G. G. TEMPLER.

THE chief interest attaching to the small locomotive here illustrated is that it is the sole survivor of the moiety of the Birkenhead Railway locomotive stock taken over by the G.W.R. in 1860, and is now the oldest locomotive at work on the latter system. Built for the Birkenhead Railway as No. 39 by Sharp, Stewart & Co. in 1856, she then had 14 in. × 20 in. cylinders; these were altered to 14½ in. × 18 in. in 1871, the engine in the meantime having been allotted No. 96 in the G.W.R. list. She was rebuilt at Wolverhampton in 1888, when the working pressure was raised from 120 to 140 lb. per sq. in., other leading dimensions after rebuilding being as follows:—

Boiler—	
Barrel length ..	9 ft. 10 in.
Diameter (inside) ..	3 ft. 6 in.
Firebox—	
Outside	3 ft. 6 in. × 4 ft. 1¼ in.
Inside	2 ft. 9 7/16 in. × 3 ft. 4¾ in.
Height	4 ft. 6 in.
Tubes—	
No.	190
Diameter	1⅝ in.
Length	10 ft. 1¼ in.
Heating surface—	
Tubes	829 sq. ft.
Firebox	60 sq. ft.
Total	889 sq. ft.
Grate area	9·4 sq. ft.
Cylinders	14½ in. × 18 in.
Coupled wheels—	
Diameter	4 ft.
Wheelbase	7 ft. 2 in.
Tractive force ..	9,380 lb.
Tank capacity ..	490 gallons.
Weight in working order	25 tons 17 cwt.

A sister engine, No. 95 (Birkenhead Railway No. 6), was condemned in December, 1924. She differed from No. 96 in having the chimney and dome cut down, no roof or back to cab, and 3 ft. 6 in. wheels, which gave a slight increase in the tractive force.

The foregoing particulars were very kindly supplied by Mr. C. B. Collett, C.B.E., Chief Mechanical Engineer, Great Western Railway, and the writer is indebted to Mr. F. W. Hutton-Stott for the photograph.

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Reminiscences of a Retired Great Western Railway Superintendent. [II.]

By G. GRANT

(*Formerly Divisional Superintendent at Chester and Plymouth. Mr. Grant retired in* 1911.)

FROM the cul-de-sac at Bridport to the busiest junction (Westbury) between Bristol, Southampton and Weymouth brought me into closer intercourse with officials and with the railway duties of several grades as performed at that time.

The platforms and lines here had a low covered roof. This confined the smoke, smuts and sulphur emitted by train engines. To add to the dense atmosphere there were, on the west side, three iron-furnaces in blast night and day, belching forth clouds of sparks, dust and sulphur. Desks, tables, chairs, books and forms were continually covered with thick particles of matter, while the sulphurous atmosphere irritated eyes and nostrils.

I found the duties easy. The tonnage and charges of the Westbury Iron Company's traffic were heavy for few entries. The monthly returns were similar to those at Bridport. While my duties were in the office, the stir and animation of people, with the movement of trains, attracted me to the platform. On Sundays I was in charge of trains and staff. Bath and Bristol were the places mostly visited by Westbury people.

The Westbury stationmaster confined his attention to the platform, the working of trains and the correspondence referring thereto ; he left the accounts and monthly returns to me. What made the duties easy was the long intervals between trains. These came in groups at 8 a.m., 11.30 a.m., 3 p.m. and 8 p.m. Up from Weymouth and Salisbury, down from Chippenham and Bristol ; Westbury was their meeting place.

There was one new duty here. Trains on single lines met at certain passing places ; any changes were made by the stationmasters at each end of the section exchanging a telegraph message, which the receiver had to repeat verbatim to sender. These telegrams were termed "Crossing Orders." Spagnoletti's single needle was used at Westbury.

I had been casually told by the stationmaster that I was expected to work the instrument. When I had been there six weeks, at 8 a.m. I heard that Warminster had an important message ; the telegraph clerk was ill, the night pointsman had left duty. No one there could deal with the message. I made the venture. After many repetitions I sent it back to Warminster, and was told "Quite right." It was thus that I began my responsibility with "Crossing Orders."

The great snow-storm of 1881 had a forerunner in the winter of 1866-1867. A heavy fall of snow, saturated with moisture, broke all the telegraph wires in the West of England. There was literally no news from anywhere. Four trains were due at 8 a.m., not one came. The working of trains depended on telegraph messages, but none could be exchanged. The train from Weymouth, due at 8 a.m., arrived four hours late. The one from Salisbury, due at the same hour, came at 3.30 p.m., having taken over nine hours to travel 24 miles. The telegraph staff were engaged for six months in repairing the damage.

There were some compensations in the "good old days." There was less hustle, there seemed to be more than 60 seconds in a minute. Methods were less distinctively outlined. Plans had to be improvised on the spur of the moment to meet sudden demands. Even signals differed. On broad-gauge lines, instead of a semaphore a double indication was used. A circular disc towards a train meant "clear." If the cross-bar showed it signified "danger." By night red was "danger" and a white light "clear." Green was used only as a caution signal in shunting operations.

I propose to record the duties of railwaymen as I saw them sixty years ago. Could they reappear they might say to grousers of to-day, "Were we upon beds of roses?"

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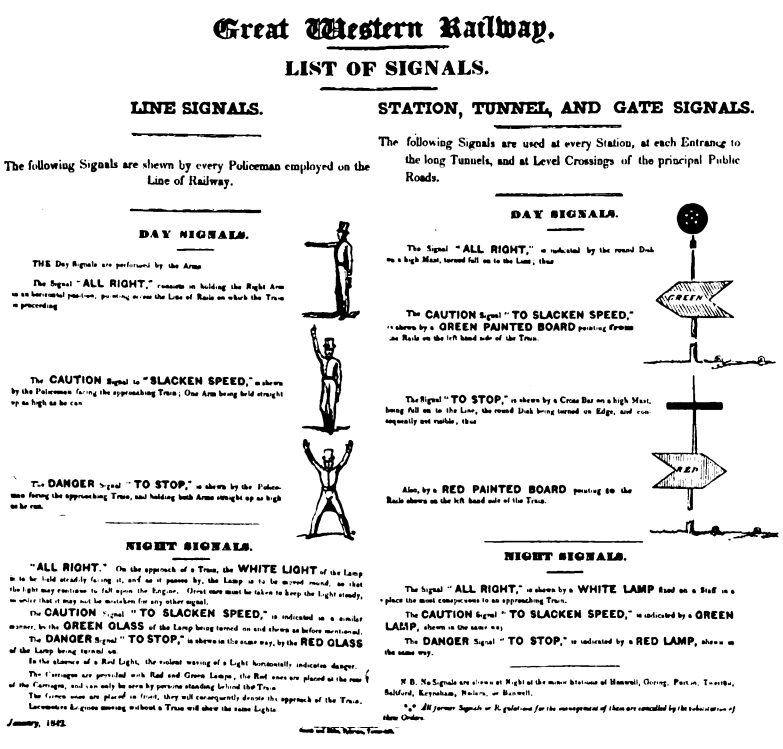
The distinction between railway work in 1860 and fifty years later was that in the former period more responsibility rested upon the man. The safety of the public depended more upon his forethought than in later times, when so many mechanical inventions have been provided to assist his memory.

This is an outline of what the men then working at Westbury had to do.

Signalmen were termed pointsmen. Some of the points in shunting yards were worked from a capstan by a horizontal lever, and the disc on the capstan indicated the position of the points. They were on duty twelve hours. Their work involved running from one end of a shunting yard to the other, across sidings, over rough ballast, through pools of water. This had to be done day and night. There was no overhead illuminant, a man had only his handlamp to guide his footsteps. When a shunter had uncoupled trucks, the pointsmen had to turn the points of the siding into which they were going. Shunting operations might be going on in contiguous sidings or engines blowing off steam.

While thus engaged he had to think of trains on the main line, the signals for which he had to work, and to satisfy himself that all points were set in the right position. There were no telephones then, and the telegraph instrument was in an office some distance away. Time was his guide or the whistle of an approaching train. His instructions were that no second train might follow an express under a margin of five minutes ; an ordinary passenger train must have a start of ten, and a goods train fifteen.

His shelter was generally a sentry box. One of his anxieties was whether someone might have interfered with points after he had fixed them. When in after years I visited cabins, warm, well-lighted, with rows of levers close at hand, interlocked, so that points and signals must agree ; telephones, warning bells, all up-to-date modern appliances, with only eight hours duty, I could not help making a comparison between past and present, or fail



Great Western Railway.

LIST OF SIGNALS.

LINE SIGNALS.

The following Signals are shewn by every Policeman employed on the Line of Railway.

DAY SIGNALS.

THE Day Signals are performed by the Arms

The Signal "ALL RIGHT," consists in holding the Right Arm in an horizontal position, pointing across the Line of Rails on which the Train is proceeding

The CAUTION Signal to "SLACKEN SPEED," is shewn by the Policeman facing the approaching Train; One Arm being held straight up as high as he can

The DANGER Signal "TO STOP," is shewn by the Policeman facing the approaching Train, and holding both Arms straight up as high as he can.

NIGHT SIGNALS.

"ALL RIGHT." On the approach of a Train, the WHITE LIGHT of the Lamp is to be held steadily facing it, and as it passes by, the Lamp is to be moved round, so that the light may continue to fall upon the Engine. Great care must be taken to keep the Light steady, in order that it may not be mistaken for any other signal.

The CAUTION Signal "TO SLACKEN SPEED," is indicated in a similar manner, by the GREEN GLASS of the Lamp being turned on and shewn as before mentioned.

The DANGER Signal "TO STOP," is shewn in the same way, by the RED GLASS of the Lamp being turned on.

In the absence of a Red Light, the violent waving of a Light horizontally indicates danger.

The Carriages are provided with Red and Green Lamps, the Red ones are placed at the rear of the Carriages, and can only be seen by persons standing behind the Train.

The Green ones are placed in front, they will consequently denote the approach of the Train.

Locomotive Engines moving without a Train will shew the same Lights

January, 1842.

STATION, TUNNEL, AND GATE SIGNALS.

The following Signals are used at every Station, at each Entrance to the long Tunnels, and at Level Crossings of the principal Public Roads.

DAY SIGNALS.

The Signal "ALL RIGHT," is indicated by the round Disk on a high Mast, turned full on to the Line; thus

The CAUTION Signal "TO SLACKEN SPEED," is shewn by a GREEN PAINTED BOARD pointing from the Rails on the left hand side of the Train.

The Signal "TO STOP," is shewn by a Cross Bar on a high Mast, being full on to the Line, the round Disk being turned on Edge, and consequently not visible, thus

Also, by a RED PAINTED BOARD pointing to the Rails shewn on the left hand side of the Train.

NIGHT SIGNALS.

The Signal "ALL RIGHT," is shewn by a WHITE LAMP fixed on a Staff in a place the most conspicuous to an approaching Train.

The CAUTION Signal "TO SLACKEN SPEED," is indicated by a GREEN LAMP, shewn in the same way

The DANGER Signal "TO STOP," is indicated by a RED LAMP, shewn in the same way.

N.B. No Signals are shewn at Night at the minor Stations of Hanwell, Goring, Porton, Twerton, Saltford, Keynsham, Nailsea, or Banwell.

*** All former Signals or Regulations for the management of them are cancelled by the substitution of these Orders.

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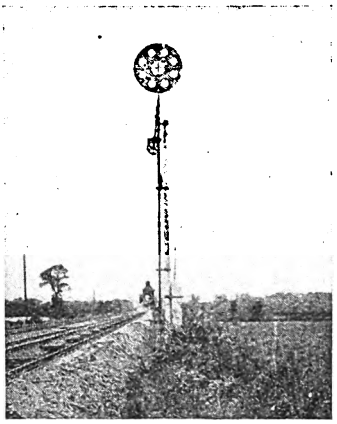
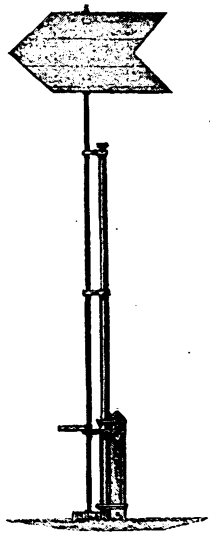
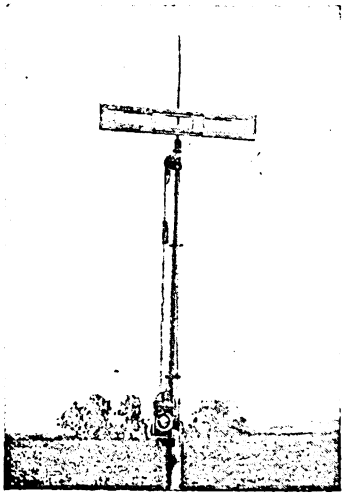


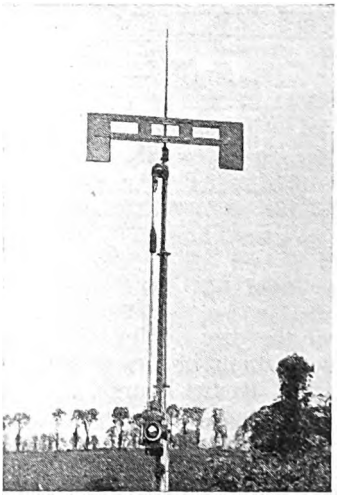
DISC AND CROSSBAR SIGNAL.
Line Clear.



BOARD OR FANTAIL SIGNAL.
Caution.



UP DISC AND CROSSBAR SIGNAL.
Danger.



DOWN DISC AND CROSSBAR SIGNAL.
Danger.

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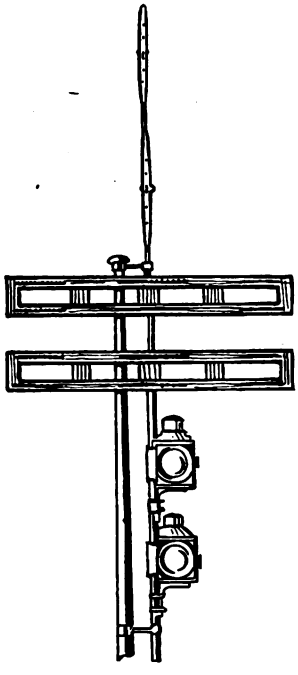
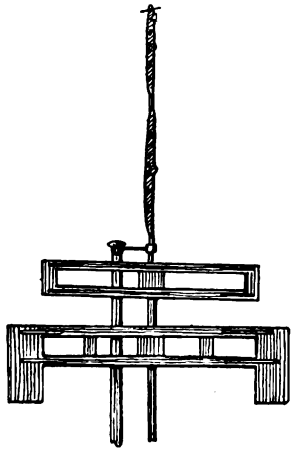
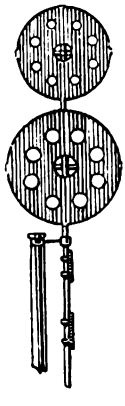


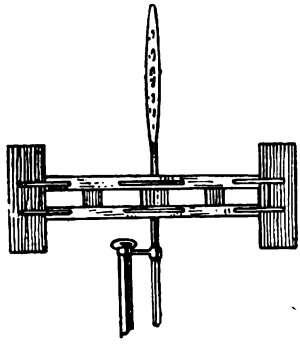
UP JUNCTION SIGNAL.
Danger.



DOWN JUNCTION SIGNAL.
Danger.



UP OR DOWN JUNCTION SIGNAL.
Clear.



LEVEL CROSSING SIGNAL.
Both Lines. Danger.

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to think how much less laborious was the position to-day, notwithstanding the increase in the number of trains, than that of his predecessor 60 years ago, with his exposure and 72 hours a week.

Shunters shared in many of the trials of the pointsmen, with others added. The operation of coupling and uncoupling wagons meant creeping under the buffers and handling heavy iron hooks and chains. Whatever the weather, snow or ice, rain or wind, the shunter had to handle the couplings. While doing so the engine at times moved too far, or the buffers were relaxed and pushed wagons against the shunter. With a longitudinal road, water in winter stood in pools between the rails. In 1865 there were no yard lamps, the shunter's handlamp was the only light, and this he could not take with him while engaged between wagons.

There were then no brakes on goods trucks ; men had to use hand scotches and sprags. The process of shunting was less certain, the only brake on engines was the fireman's hand-brake, which in frosty or damp weather was uncertain in action. Conformably with other servants, shunters had to work from 6 a.m. to 6 p.m. Wages were about 20s. a week. Men were not then supplied with leggings, they were given an overcoat once in two years. There was no cabin for shunters. The goods office was the men's only refuge against rain or in which to dry wet clothes or eat their frugal meals.

It was at Westbury that I first got into touch with the duties of goods guards. I will give particulars of one train that was most prominent here. It left Chippenham at 7 a.m., ran 17 miles on a double line to Westbury and 24 on a single thence to Salisbury. It was really a travelling shunting engine and had to do all the local work at eleven stations. The largest exchange was at Westbury, where main line trains up and down left wagons for the Salisbury branch.

Between Westbury and Warminster was an incline 3 miles long. This local train with its one engine had to make as many trips as were necessary to clear the Westbury yard of all traffic for the branch. It averaged three trips ; occasionally four were run. The guards had to decide from the nature of the traffic how many vehicles an engine could take. The head guard (Gane), an ideal type of guard, told me that at times so slender was the margin between power and load that sometimes he and his mate would alight, and he believed their pushing avoided having to divide the train on the incline.

At times the single line, when trains were late, was so occupied that the goods reached Salisbury two hours late, which made it correspondingly late on the return journey. The guards were booked out twelve hours, when late they were out more.

Another train then running was from Swindon to Weymouth, returning next day. For years they were worked by brothers "Kilby." Leaving Swindon at 4 a.m., it had to call at most stations on the way in a journey of 90 miles, half of them on a single line. When they were put out, of course, as frequently happened in summer owing to more passenger trains, they did not reach Weymouth until 8, 9, and sometimes 10 p.m. When this happened the return train had still to start at 4 a.m. as usual. For some years I saw these men regularly and never heard a grumble from either.

The old and dangerous way of creeping under the buffers of trucks and handling chains when coupling or uncoupling was accepted as inevitable until a goods guard used a length of gas pipe to avoid having to stoop to uncouple. The danger may be illustrated by this—a guard on a wet day wearing a mackintosh got between the buffers as usual, but in stooping to handle the chains his mackintosh was caught by the wheel, and he was pulled with it to his death.

To induce men to use a shunting pole, prizes were offered to those most efficient in using them. So well did this succeed that a clever shunter could couple and uncouple 20 trucks in a hundred and forty seconds. The safer and more convenient way of coupling by use of a pole soon prevailed everywhere.

(To be continued.)

(Illustrations from E. T. McDermot's "History of the Great Western Railway.")

[As we close for press we regret to hear of the sudden death of Mr. Grant.]

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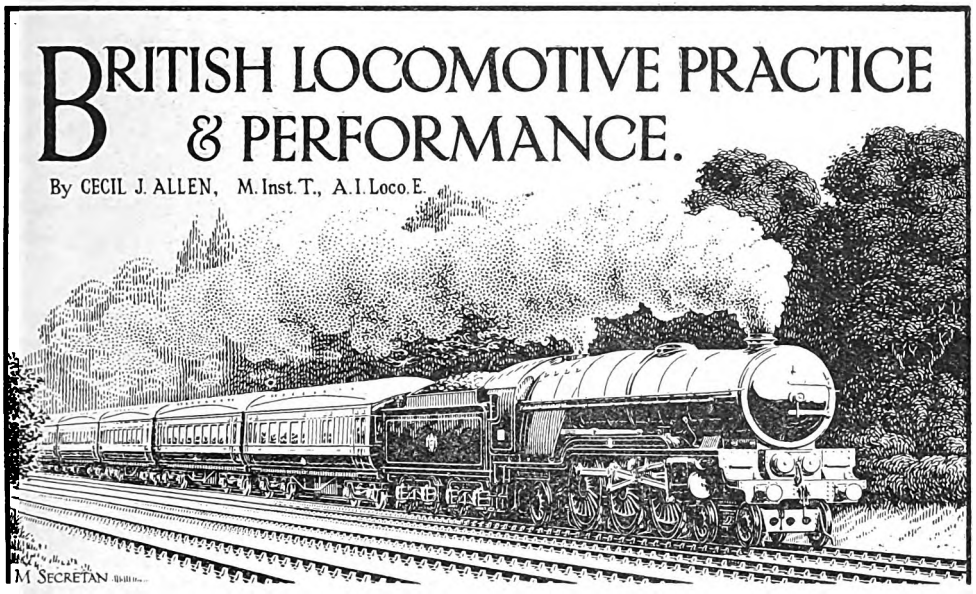
BRITISH LOCOMOTIVE PRACTICE & PERFORMANCE.

By CECIL J. ALLEN, M.Inst.T., A.I.Loco.E.



IN the present article I want to direct attention to recent running over the West of England main line of the Southern Railway. It is some considerable time since this route last figured in these columns—a fact of which aggrieved Southern readers have not failed to remind me—but I have been waiting in the hope of enjoying some personal experiences behind engines of the "Lord Nelson" class, which are now working regularly through to Exeter. This hope has not come to fruition, however, and I am therefore dependent on the logs which various readers have been good enough to forward to me during the past few months. Most of the hardest tasks detailed were in the hands of the amazingly competent "King Arthurs"; but certain of the "Lord Nelson" journeys, especially those on which delays were experienced, show some significant feats.

We will begin with the Salisbury and Exeter section. *Lord Rodney,* in the first run, had an absurdly easy task with the winter load of the "Atlantic Coast Express," weighing only 275 tons all told, and after a brisk start to Wilton and some good going up to Semley (with 2 final miles at 1 in 145), took things easily, especially on the up-grades. The only minimum rate noted in the log submitted was 25 m.p.h. at Honiton Summit (after 4½ miles at 1 in 80, preceded by 1½ at 100 and followed by ¾ at 132); maxima were 73½ at Gillingham, 75 at Sherborne, 75 at Axminster, and, finally, 80 at Broad Clyst, between the Sidmouth Junction stop and Exeter.

On the second run "King Arthur" 4-6-0 *Sir Nerovens,* after a leisurely exit to Wilton, did some remarkable running up to Semley, attaining 65 m.p.h. in the dip before Dinton, breasting the gentle rise to Tisbury at a minimum of 62 and the final 2 miles at 1 in 145 to Semley at a lowest rate of 54 m.p.h. Indeed, the average rate from Wilton up to Semley was a shade over 60 m.p.h. throughout—a remarkable achievement—after which *Sir Nerovens* touched 77½ m.p.h. at Gillingham. The only check experienced was the p.w. slowing in Gillingham Tunnel; subsequently the speeds were 61 m.p.h. at Abbey Ford, 35 at mile-post 113½ (up a mile at 1 in 80 and 1½ at 100), 82 at Sherborne, 47 up Sutton Bingham bank (3 miles at 150-140), 70½ before Crewkerne, 40½ at mile-post 133¼ (after 2¾ miles at 1 in 80—another first-class feat), and 80 below Axminster, where, despite the Gillingham check, *Sir Nerovens* was ¾-min. "up" on *Lord Rodney.* Minimum at Honiton Summit was 21½ m.p.h., and a gentle descent through Honiton brought the train into Sidmouth Junction 2 min. inside schedule time.

Sir Galahad was responsible for two exceptionally fine runs, the first of which, with a heavy train of 370 tons all told,

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Photo.] **EXCURSION TRAIN NEAR AMBERGATE.** [*H. Gordon Tidey.*
2-6-0 No. 13098.

Photo.] [*E. Hyde & J. L. Adams.*
BIRMINGHAM-BOURNEMOUTH EXPRESS NEAR BLACKWELL.
4-4-0 No. 531.

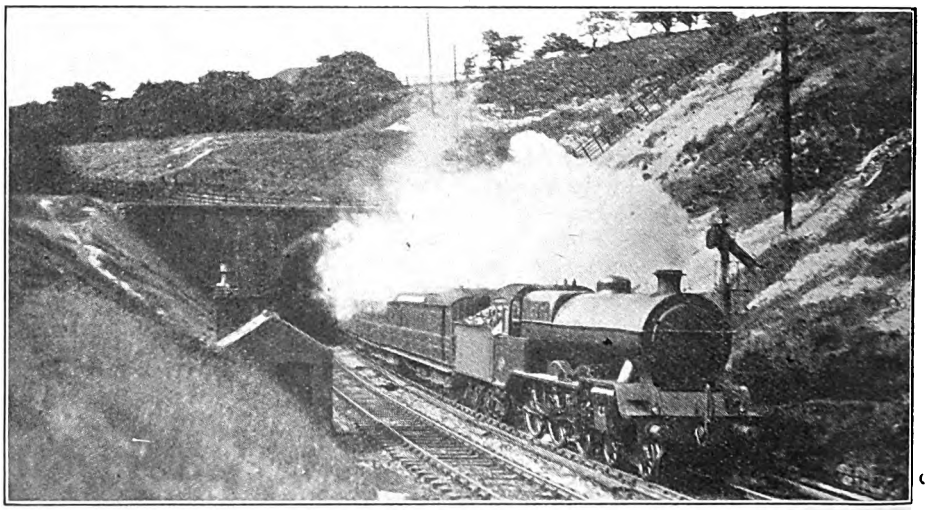

Photo.] **BRADFORD-MARYLEBONE EXPRESS LEAVING BOWLING TUNNEL.** [*F. Ingham.*
L. and Y. 4-6-0.

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appears in the third column. The time of 5 min. 55 sec. out to Wilton, with such a load, was most exceptional, seeing that the first mile from the Salisbury start is as steep as 1 in 115. The maximum rate attained between Wilton and Dinton was 57½ m.p.h., and speed had fallen to 48 an hour at Tisbury before the p.w. check which spoiled the final stage of the Semley ascent. Maxima at Gillingham and Abbey Ford were 72 and 71½ m.p.h. respectively, with an intervening minimum of 53½ m.p.h. Templecombe bank was breasted at a minimum of 40½ an hour, and Sherborne was passed at 75. Then came a minimum of 45 m.p.h. up Sutton Bingham bank, with a maximum of 67 at Hardington, and a lowest rate of 36½ m.p.h. at Hewish Summit. Down to Axminster the top speed was a sustained 77½ m.p.h., and on the climb to Honiton Summit speed did not fall below 26¾ m.p.h.—another excellent achievement up a worse ascent than Shap. The final maximum before the Sidmouth Junction stop was 77½ m.p.h. Thus, despite the Tisbury delay, time was just kept.

In the fourth column *Sir Nerovens* found a load of 430 tons a trifle too onerous for timekeeping over such grades. At mile-post 85—the summit of the 1 in 115 out of Salisbury—a speed of 21½ m.p.h. had been attained, and Dinton and Tisbury were both passed at 54 an hour. A minimum of 42 m.p.h. at Semley was succeeded by a maximum of 70 m.p.h. through Gillingham, followed, in its turn, by the tunnel p.w. slack. Attaining 60 m.p.h. again at Abbey Ford, *Sir Nerovens* went up Templecombe bank at a minimum of 34½ m.p.h., and passed Sherborne at 79 m.p.h., Yeovil Junction at 71½, mile-post 126¼ at 52, Crewkerne at 69 and mile-post 133¼ at 33 m.p.h. There was some easing before Chard, doubtless through the necessity for getting the boiler full after the arduous work just concluded, and in view of the still more arduous ascent ahead. But the driver worked up to 83½ m.p.h. at Axminster, and then, with his 430-ton train, went right up to Honiton Summit at a lowest rate of 20½ m.p.h. on the 1 in 80, recovering to 24½ on the 1 in 126 through the tunnel. Although the net time of 88 min. represented an excess of a minute on schedule, *Sir Nerovens* had nothing to be ashamed of in such conditions. The short run into Exeter was further delayed slightly by a p.w.r. check at Exmouth Junction, but time was kept.

We now come to the non-stop runs from Salisbury to Exeter, made during the operation of the summer train service. In the first of these *Lord Nelson* was himself concerned, though with but a modest load of 315 tons all told. There was some smart running up to Semley, but this did not attain in merit to that of *Sir Nerovens* on the second run; speeds were 62 m.p.h. at Dinton and 45 at Semley. Before and after Gillingham a p.w.r. check ruined any prospect of a high maximum speed, and probably cost about 3½ min. After that his Lordship got away in great style, making the best times of the series from Templecombe to Axminster. Speeds were 42 m.p.h. at mile-post 113½, 81 at Sherborne, 76 at Yeovil Junction, 49 up Sutton Bingham bank, 65 at Crewkerne, 33½—this was the only weak feature of the running—at mile-post 133¼, and 79 below Axminster, after which there was a disastrous signal check at Seaton Junction, of all places, costing fully 4 min. The correspondent who sent this log gives no details of the climbing to Honiton Summit which succeeded this check, but he does give some interesting figures of the whirlwind descent by which the driver regained as much as possible of the lost time between Honiton Tunnel and Exeter. It produced speeds of 80½ m.p.h. before and 66 after Sidmouth Junction, followed by a top speed of 86 an hour at Broad Clyst; the average speed from Whimple to Pinhoe was 84 m.p.h. With a perfectly clear road into Queen Street the most unusual time was achieved of 14 min. 25 sec. over the 16.8 miles from Honiton to Exeter stop. Allowing for the delays, the net time for the 88 miles from Salisbury to Exeter was not more than 92½ min., equal to an average speed of 57.1 m.p.h. from start-to-stop over this remarkably difficult course, and all but 2½ min. of the 8 min. lost were thus regained.

Then comes *Lord Nelson* again with a considerably heavier load, amounting to 12 bogies of the latest stock, or 410 tons in all. Apart from the slower start to Wilton, and the hampering influence of

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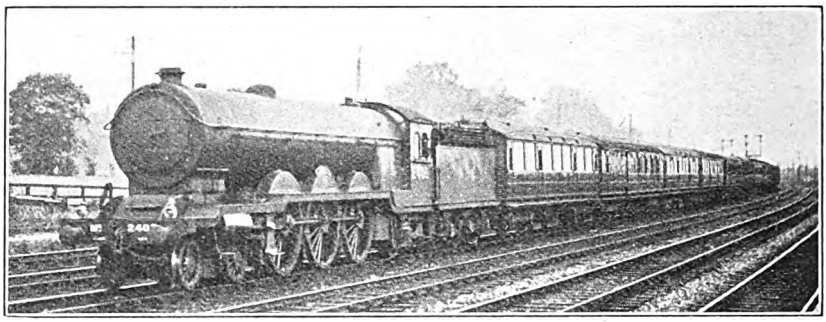

Photo.] **LONDON-NEWCASTLE EXPRESS NEAR YORK.** [*C. J. L. Romanes.*
4-6-2 No. 2403 *City of Durham.*

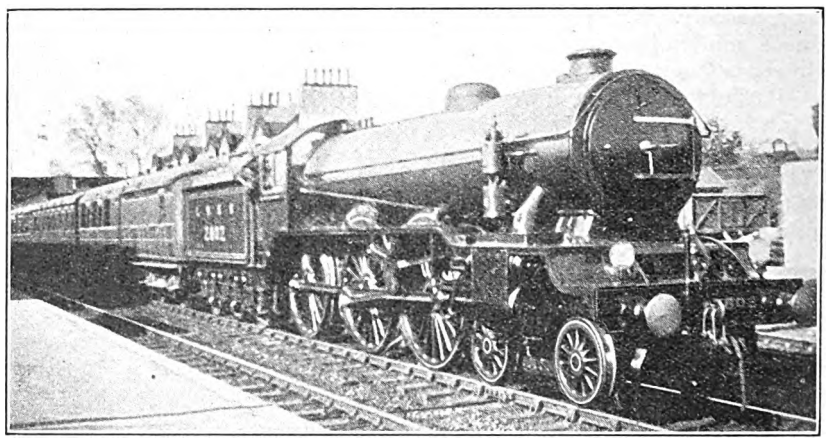

Photo.] [*L. V. Benson.*
LIVERPOOL STREET-CAMBRIDGE EXPRESS AT BROXBOURNE.
4-6-0 No. 2802 *Walsingham.*

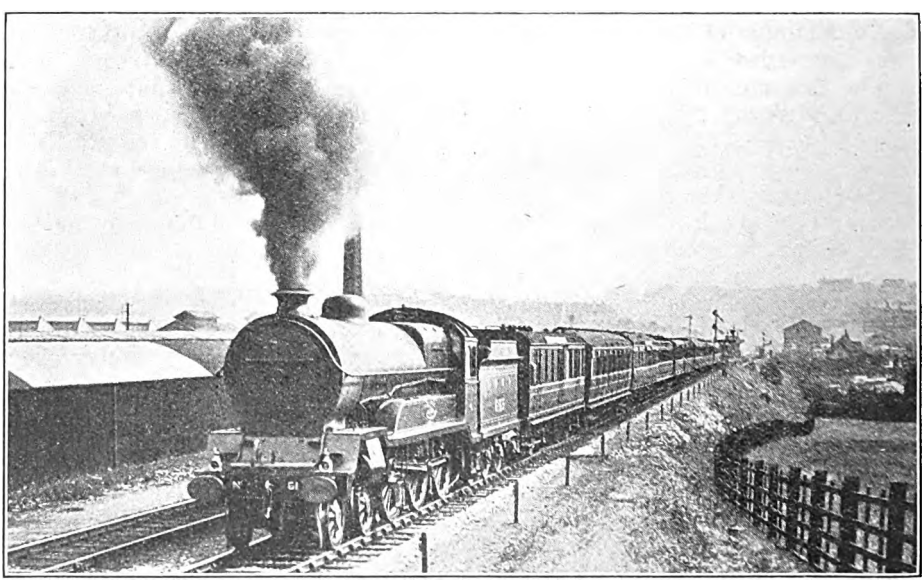

Photo.] **BOAT SPECIAL TO IMMINGHAM NEAR NOTTINGHAM.** [*G. Hepburn.*
4-6-0 No. 6165 *Valour.*

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the subsequent p.w. check, the similarity between this and the preceding run is very extraordinary. Close correspondences in intermediate times are generally rare over a road of this character, and the difference of nearly 100 tons in load makes the agreement the more striking. Point-to-point times from Templecombe to Axminster, beyond which the previous run suffered a signal check, in many cases exactly equal each other, and in no case differ by more than 5 sec. It is unfortunate that the correspondent sending this run gives no details of the speeds, and the more so in that the driver—surely the same hand must have been at the regulator!—developed the whirlwind of his previous descent into Exeter into a positive hurricane on this trip. A time of 12 min. 10 sec. over the 15.8 miles from Honiton to Exmouth Junction involved an average speed of all but 78 m.p.h.; the average from Sidmouth Junction to Pinhoe was 81.6 m.p.h., and from Whimple to Pinhoe 85.8 m.p.h.; indeed, it is probable that the top speed was almost, if not quite, 90 m.p.h. An astonishing time, too, was 67¾ min. for the 69.3 miles from Semley to Exmouth Junction—over this road and with 410 tons! The net time of 93 min. from Salisbury to Exeter gives an average start-to-stop speed of 56.8 m.p.h., and time was just kept, delay included.

Despite this, the major honours in this table must go to the smaller "King Arthur" 4-6-0, *Sir Galahad,* which in the last column worked precisely the same load from Salisbury to Exeter in a net time of 94¼ min., or but 1¼ min. more than that of *Lord Nelson.* The start from Salisbury to Wilton was practically equal to that of the bigger engine, and after the checks on both runs had been recovered from, the gallant Knight stuck closely to the heels of the Admiral from Milborne Port to mile-post 133¼, the total times between the two runs practically tieing between these points. But the greatest triumph of *Sir Galahad* was in the climb from mile-post 147 to Honiton Summit; from Seaton Junction to the top the smaller engine actually beat the bigger by just over half-a-minute! Too much need not be drawn, by way of deduction, from this comparison, without any information as to the way in which the two engines were being worked; but it can be said with tolerable certainty that no finer "King Arthur" run than this has yet been published. The important speeds on this trip were 46½ m.p.h. at Semley—a wonderful figure—44 at mile-post 113½, 76½ at Sherborne, 40½ at mile-post 133¼, 76 below Axminster, 21.2 at mile-post 152½ (the top of the 1 in 80), and 83½ at Broad Clyst. It is fortunate that the recorder of this run is one of the most competent timers of my acquaintance, so that the details may be accepted without question as authentic.

The table of up runs from Exeter to Salisbury begins with some fast running by the Urie 4-6-0 *Merlin,* but with a light load of only 240 tons. The first short run to Sidmouth Junction was normal, with speeds of 68 m.p.h. at Broad Clyst, and 44 minimum up the 5½-mile ascent past Whimple, steepening from 1 in 170 to 1 in 100. Attaining 50½ an hour in the dip after the re-start, *Merlin* went up the 4½ miles at 1 in 100-90 to Honiton Summit at a lowest rate of 36 m.p.h. Then followed speeds of 82 m.p.h. past Seaton Junction, 47 minimum on the long rise to Hewish, 77 below Crewkerne, 59 at Sutton Bingham, 71½ at Yeovil, and 38 minimum up the 2 miles of Sherborne bank, of which the final 1¼ miles are at 1 in 80. Apart from the signal check outside Templecombe, there would have been a gain of 5¾ min. over this length. The concluding run into Salisbury was devoid of note, with a fall in speed from 57 to 36 m.p.h. up the 3¾ miles at 1 in 130-100 from Gillingham to Semley, and a maximum of 68 at Dinton; the two p.w. checks involved a loss of 2¾ min.

In the next column *Lord Rodney* made what must be regarded as a poor run for an engine of the "Lord Nelson" type, though its poverty was probably attributable more to driving than to design. The faults of the run were very slack uphill running, counterbalanced by extremely high downhill speeds. For example, after a smart start to Broad Clyst, with a maximum of 69 m.p.h., speed dropped to 35½ up Whimple bank. Again, the minimum of 27½ up Honiton bank was followed by a top speed of 86½ m.p.h. below Seaton Junction, which in

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its turn gave place to a minimum of 36½ m.p.h. at Hewish. After this speeds were 77½ m.p.h. beyond Crewkerne, 50½ at mile-post 126¼, 71½ at Yeovil Junction, and then, after the bad slowings at Sherborne, one to 10 m.p.h., no higher attained speed than 21 m.p.h. at Sherborne bank. There was thus a loss of 5 min. from Sidmouth Junction to Templecombe, though the p.w. delays cost 5½ min. After leaving Templecombe, the engine touched 62 m.p.h. at Gillingham, but fell to 35½ at Semley; then came an unusually fast descent to Salisbury, speed ranging from 70½ to 76½ m.p.h. from Tisbury down to Wilton. In this way 2¾ min. of the time lost from Sidmouth Junction to Templecombe was recouped. But it was not a satisfactory run.

In the third column *Tintagel* made a very fair trip for one of the Urie engines, whose performances are usually somewhat inferior to those of the "King Arthurs"

SOUTHERN RAILWAY—SALISBURY TO EXETER.

Distance.	Engine, 4-6-0 No. ..	Schedule.	863 N	784 K	456 K	784 K	Schedule.	850 N	850 N	456 K
	,, Name		*Lord Rodney*	*Sir Nero-vens*	*Sir Gala-had*	*Sir Nero-vens*		*Lord Nelson*	*Lord Nelson*	*Sir Gala-had.*
	Load (axles)		*32	36	44	*52		36	48	48
	,, (tons tare) ..		*260	279	352	*407		294	389	389
	,, ,, full) ..		*275	295	370	*430		315	410	410
miles.		min.	m. s.	m. s.	m. s.	m. s.	min.	m. s.	m. s.	m. s.
0·0	SALISBURY.. ..	0	0 00	0 00	0 00	0 00	0	0 00	0 00	0 00
2·5	Wilton	—	5 35	6 30	5 55	6 45	—	5 55	6 25	6 30
									p.w.s.	
8·2	Dinton	—	12 20	12 40	12 20	14 00	—	12 20	15 55	12 50
12·5	Tisbury	—	16 50	16 40	17 05	19 10	—	16 45	21 25	17 08
					p.w.s.					
17·6	Semley	—	22 20	21 30	25 00	25 20	—	22 15	27 35	22 51
								p.w.s.		
21·7	Gillingham	—	26 05	25 15	29 10	29 10	—	27 45	31 00	26 50
				p.w.s.		p.w.s.		p.w.s.		p.w.s.
28·4	TEMPLECOMBE ..	33	32 05	33 10	35 45	37 20	33	35 40	37 10	33 54
30·8	Milborne Port ..	—	35 30	36 35	38 55	40 45	—	38 35	40 00	37 01
34·5	Sherborne	—	39 05	40 05	42 20	44 20	—	41 50	43 15	40 20
39·1	YEOVIL JC... ..	44	43 00	43 42	46 20	48 05	44	45 25	46 45	44 07
41·3	Sutton Bingham ..	—	—	45 45	48 35	50 05	—	47 30	48 50	46 13
47·9	Crewkerne	—	52 25	52 40	55 25	56 25	—	54 00	55 20	52 44
49·5	*Mile-post* 133¼ ..	—	55 15	54 50	58 10	59 15	—	56 45	58 05	55 09
										p.w.s.
55·9	Chard Junction ..		61 15	60 35	63 45	65 20	—	62 45	64 00	62 04
61·0	Axminster	—	65 20	64 40	67 45	69 30	—	66 45	68 00	67 34
								sigs.		
64·3	Seaton Junction ..	—	68 00	67 15	70 25	72 10	—	70 00	70 30	70 15
								sigs.		
69·7	*Mile-post* 153½ ..	—	78 45	78 15	80 30	83 15	—	84 35	81 35	80 49
71·2	Honiton	—	80 20	79 50	81 55	84 50	—	86 05	83 10	82 29
						p.w.s.				
75·8	SIDMOUTH JC.	87	85 05	85 20	87 05	90 30	85	89 55	86 55	86 25
79·5	Whimple	—	5 55	—	—	6 05	—	93 05	89 50	89 37
85·1	Pinhoe	—	10 45	—	—	10 30	—	97 05	93 45	93 52
										sigs.
86·9	*Exmouth Junction* ..	12	12 15	—	—	12 20	95	98 30	95 20	96 05
						p.w.s.				
88·0	EXETER	15	14 40	—	—	14 55	98	100 30	97 45	98 45
	Net times :—									
75·8	Salisbury-Sid. Jc. ..	87	85	83¼	84½	88	98	92½	93	94¼
12·2	Sidmouth Jc.-Exeter.	15	14¾	—	—	14½				

N: "Lord Nelson" class. K: "King Arthur" class.
* Less 8 axles (= 62/65 tons) Sidmouth Junction to Exeter.

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proper. The start (which includes ¾-mile at 1 in 100 up past Exmouth Junction) was particularly brisk, and speed reached 68 an hour at Broad Clyst, though it fell to 32 up Whimple bank. Then followed speeds of 45 m.p.h. before Honiton, 25½ at the summit, 84½ at Seaton Junction, 40 at Hewish, 75 below Crewkerne, 55 at Sutton Bingham, 67 at Yeovil, and 32 minimum up Sherborne bank, which would have given a time of 56¼ min.—¾ min. under schedule—from Sidmouth Junction to Templecombe but for the concluding check. On the final stretch into Salisbury the running was badly delayed by p.w. checks.

In the fourth column, however, *Morgan le Fay* found a 15-coach train (12 earlier 8-wheelers and 3 horse-boxes) rather too tough a proposition for timekeeping. With speeds of only 58 m.p.h. at Broad Clyst and as low as 32½ up Whimple bank, the loss to Sidmouth Junction, hauling the moderate load of 330 tons,

SOUTHERN RAILWAY.—EXETER TO SALISBURY

Distance.	Engine, 4-6-0 No. ,, Name Load (axles) .. ,, (tons tare) ,, ,, full)	Schedule.	740 K *Merlin* 32 230 †240	863 N *Lord Rodney* 44 302 *320	745 K *Tintagel* 44 341 *360	750 K *Morgan le Fay* 54 362 *385	Schedule.	746 K *Pendragon* 40 314 335	Distance.	Schedule.	850 N *Lord Nelson* 44 340 360
miles.		min.	m. s.	m. s.	m. s.	m. s.	min.	m. s.	miles	min.	m. s.
0·0	EXETER ..	0	0 00	0 00	0 00	0 00	0	0 00	0·0	0	0 00
1·1	*Exmouth Jc.* ..	3	4 25	3 40	3 20	4 30	3	3 50	1·1	3	3 45
4·8	Broad Clyst ..	—	9 00	7 50	7 40	9 15	—	8 05	4·8	—	7 50
8·5	Whimple ..	—	12 45	11 50	11 50	13 45	—	12 15	8·5	—	11 20
12·2	SIDMOUTH JC.	18	17 40	17 35	17 55	19 50	18	18 00	12·2	17	16 15
4·6	Honiton ..	—	7 25	9 15	8 45	8 55	—	9 05	16·8	—	21 50
6·1	*Mile-post* 153½ ..	—	9 15	11 50	11 40	11 45	—	11 45	18·3	—	24 10
11·5	Seaton Junction	—	14 45	17 20	17 30	17 40	—	17 10	23·7	—	30 10
14·8	Axminster ..	—	17 15	19 50	20 00	20 25	—	19 50	27·0	—	32 40
19·9	Chard Junction ..	—	22 05	24 55	25 15	26 15	—	25 15	32·1	—	37 45
26·3	*Mile-post* 133¼ ..	—	29 15	33 20	33 30	34 50	—	33 50	38·5	—	45 20
27·9	Crewkerne ..	—	31 10	35 35	35 35	36 55	—	35 55	40·1	—	47 15
34·5	Sutton Bingham	—	36 50	41 55	41 35	43 05	—	41 40	46·7	—	52 45
36·7	YEOVIL JC. ..	44	38 40	43 50	43 30	45 05	44	43 40	48·9	57	54 30
41·3	Sherborne ..	—	43 05	p.w.s. 49 05	47 50	50 00	—	48 00	53·5	—	sigs. 64 00
45·0	Milborne Port ..	—	47 50	p.w.s. 58 40	52 55	55 35	—	53 00	57·2	—	70 25
47·4	TEMPLECOMBE	57	sigs. 53 20	62 05	sigs. 57 40	59 10	56	56 00	59·6	69	73 30
6·7	Gillingham ..	—	p.w.s. 11 15	9 15	p.w.s. 10 30	p.w.s. 10 25	—	62 15	66·3	—	79 40
10·8	Semley	—	16 45	14 25	17 10	16 25	—	67 10	70·4	—	84 30
15·9	Tisbury	—	p.w.s. 23 30	19 30	23 10	22 10	—	72 25	75·5	—	89 35
20.2	Dinton	—	27 45	23 05	p.w.s. 29 10	26 30	76	76 10	79·8	—	93 10
25·9	Wilton	—	33 05	28 00	35 00	32 25	—	81 10	85·5	—	98 45
28·4	SALISBURY ..	34	36 45	31 20	38 10	36 05	85	84 35	88·0	98	102·00
	Net times:—										
12·2	Exeter-Sid. Jc. ..	18	17¾	17½	18	19¾	18	18			
47·4	Sidmouth Jc.-Templecombe	57	51¼	56½	56¼	59¼	85	84½	88·0	98	96
28·4	Templecombe-Salisbury	34	33¾	31¼	34¾	35					

K: "King Arthur" class. N: "Lord Nelson" class.
* 55 tons (8 axles) less, Exeter–Sidmouth Jc.
† ,, ,, more, Templecombe-Salisbury.

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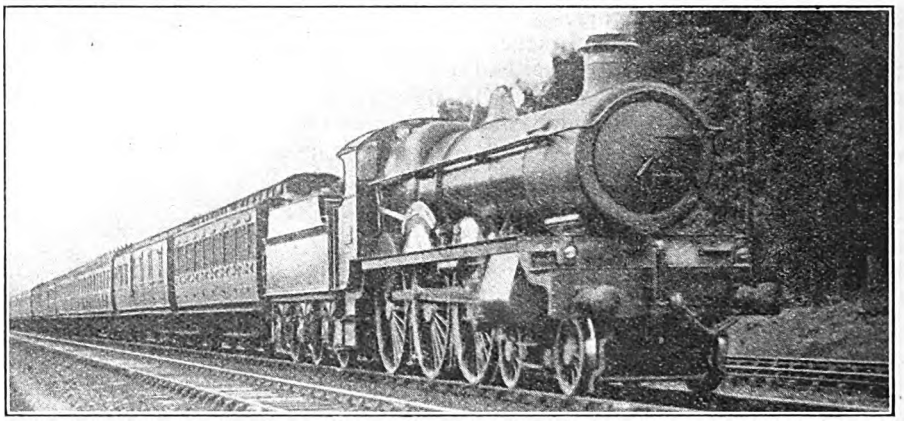

Photo.] **UP EXCURSION TRAIN.** [*M. W. Earley*

4-6-0 No. 2928 *Saint Sebastian.*

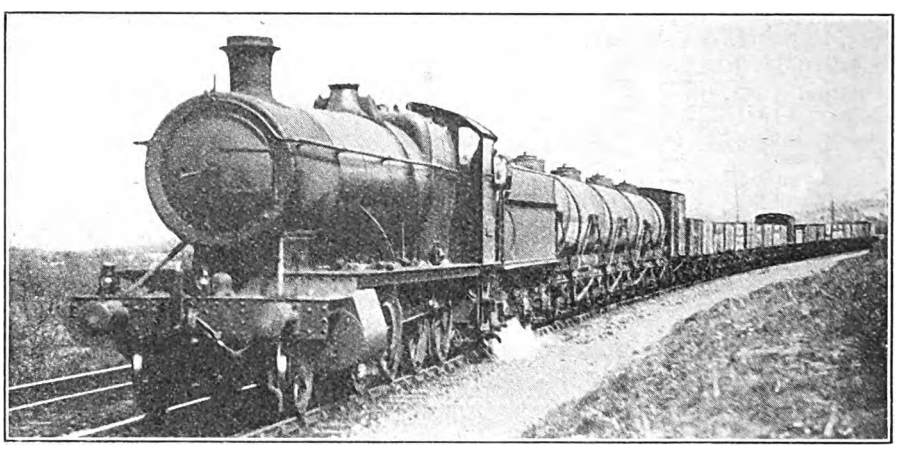

Photo.] **2-8-0 ON GOODS TRAIN.** [*H. T. Hobbs.*

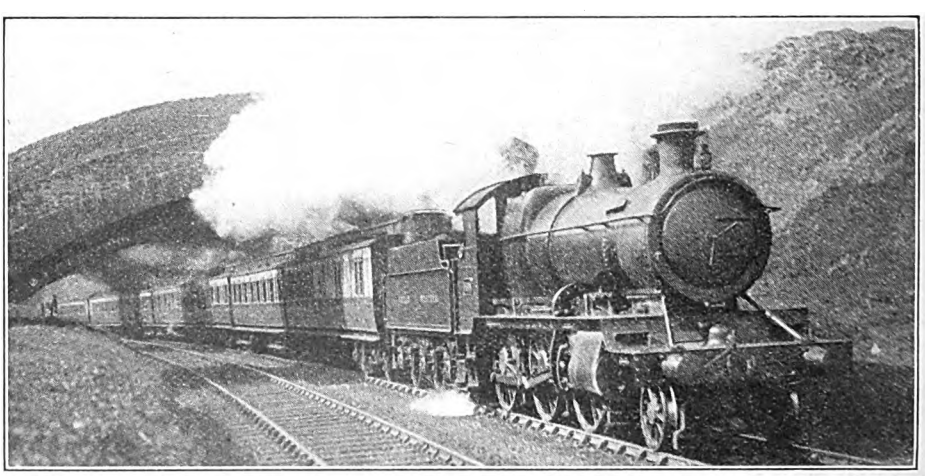

Photo.] **SWANSEA-CARDIFF TRAIN IN SKEWEN CUTTING.** [*F. R. Hebron.*

2-6-0 No. 5355.

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was nearly 2 min. The climb to Honiton Summit with the full load was good, speed not falling below 29½ m.p.h., but subsequent speeds, especially those downhill, were below the figures of previous runs. Maxima were 74 m.p.h. at Seaton Junction, 75 at Crewkerne, and only 57½ between Yeovil and Sherborne, while the minima were 38 m.p.h. at Hewish, and 29½ up Sherborne bank. After Templecombe and the Gillingham Tunnel slack, the speeds were 57½ m.p.h. at Gillingham, 30½ at Semley, and only 61 to 64 from Tisbury to Wilton, where the downhill speeds, in view of the late running, were indefensibly low. The total loss to engine from Exeter to Salisbury was thus 5 min.

Pendragon had the Sidmouth Junction stop only, and a non-stop run thence to Salisbury. In neither this case nor that of the substantially-loaded *Lord Nelson* run in the last column, have the correspondents concerned supplied me with any details as to speeds. The running of *Pendragon* closely resembled that of *Morgan le Fay* in the previous column—though with 50 tons less train-load—as between Sidmouth Junction and Crewkerne (save for a faster descent of Seaton bank), but improved on it beyond Crewkerne, the time from Gillingham up to Semley and from there down to Salisbury being especially good. So time was just kept, with ½ min. to spare, from Sidmouth Junction to Salisbury. *Lord Nelson* made easily the best start of the series from Exeter to Sidmouth Junction, despite the heaviest load of any, and then, after going moderately down Seaton bank, made the best running of all the runs except the first (where the load was 120 tons lighter) from Axminster up to Hewish Summit. The signal check after Yeovil Junction was serious, but the engine picked up well afterwards, making a further excellent time from Gillingham up to Semley and on to Salisbury. Net time on this run did not exceed 96 min., and it is significant of the onerous character of this booking that such a time represents but a bare 2 min. gained on schedule ; actually, by the bad signal check, 4 min. were lost.

We now come to the Salisbury and Waterloo runs, which comprise five in the down direction and three up, in all cases non-stop. *Sir Pelleas* leads off on the down " Atlantic Coast Express " with a very fine effort, although with a load of less than 300 tons. After a moderate start, a series of signal checks appeared to spur the driver to the remarkable performance which followed. From 25 m.p.h. through Surbiton, speed rose to 66 at Byfleet Junction, never fell below 58 on the ascent to mile-post 31, then gradually mounted to 70 at Hook, and was kept up to a minimum of 58 again on the 4¾ miles rising at 1 in 249 to Battledown—a notable achievement. *Sir Pelleas* touched 75 m.p.h. at Whitchurch and 77½ at Andover, and climbed the 7 miles to Grateley (1½ at 220 and 1¾ at 264, with a mile down at 330 intermediately ; then 2¾ miles up at 1 in 165) at a minimum of 43 m.p.h. After that the engine was very pronouncedly eased, and with nothing above 70 m.p.h. on Porton bank made a very slow approach to Salisbury. But for all that, the gain on schedule was over 2 min. in the gross time, and the net time for the 83.8 miles did not exceed 85½ min. To cover the 23.3 miles from Woking to Basingstoke in just under 21¾ min., in this direction of running, was a remarkable piece of work, as was also the time of 59¾ min. for the 63.5 miles from Weybridge to Tunnel Junction at Salisbury. The last-mentioned time, too, could easily have been cut to 58 min. by faster running from Grateley onwards.

Lord Collingwood, of the " Lord Nelson " class, made a fair run with the same load, as set out in the next column. After the p.w. check at Esher, speed rose to 66 m.p.h. at Byfleet and 64 at Fleet, but the minimum at mile-post 31, which, by comparison with the times of the previous run, must have been lower, is not given. After the second check, at Winchfield, speed rose to 60 m.p.h. in the dip beyond Hook, but fell to 50 an hour at Worting. The run concluded with maximum speeds of 75½ m.p.h. at Andover and 80 below Porton, with an intervening minimum of 52 at Grateley, and time was just kept to Salisbury. Neither of the two checks appears to have been severe, and I estimate the net time for the run at 87½ min.

Lord Nelson himself figures in the next run, but this is unfortunately another

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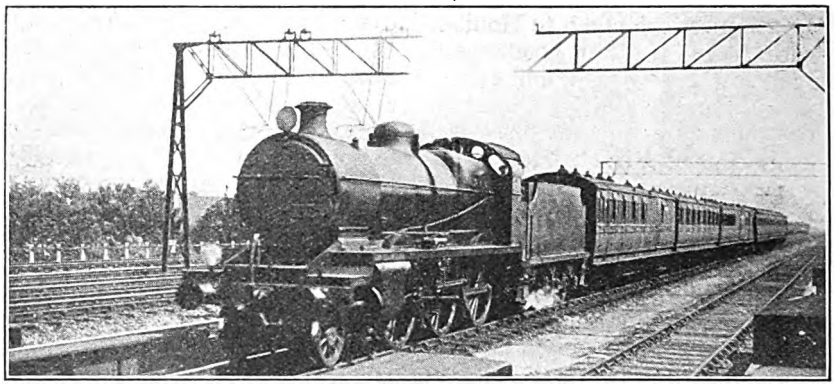

Photo.] **REDHILL TRAIN NEAR COULSDON.** [*R. W. Airy.*
2-6-0 No. 804.

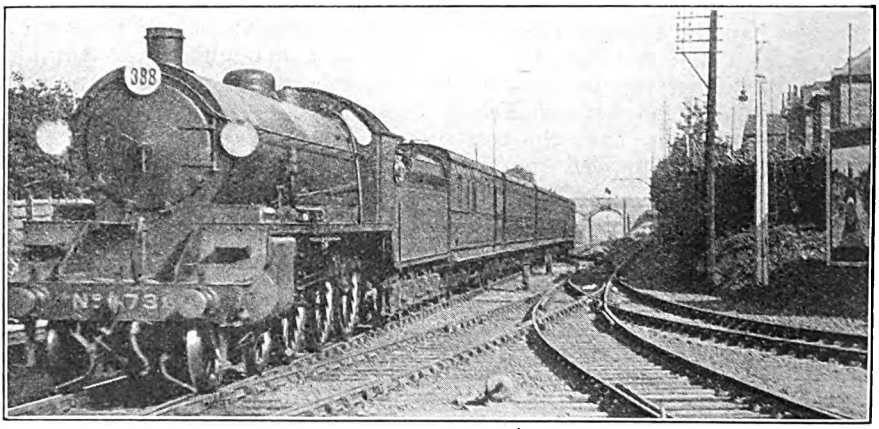

Photo.] **LOCAL TRAIN APPROACHING BOSCOMBE.** [*H. T. Hobbs.*
4-6-0 No. 736 *Excalibur.*

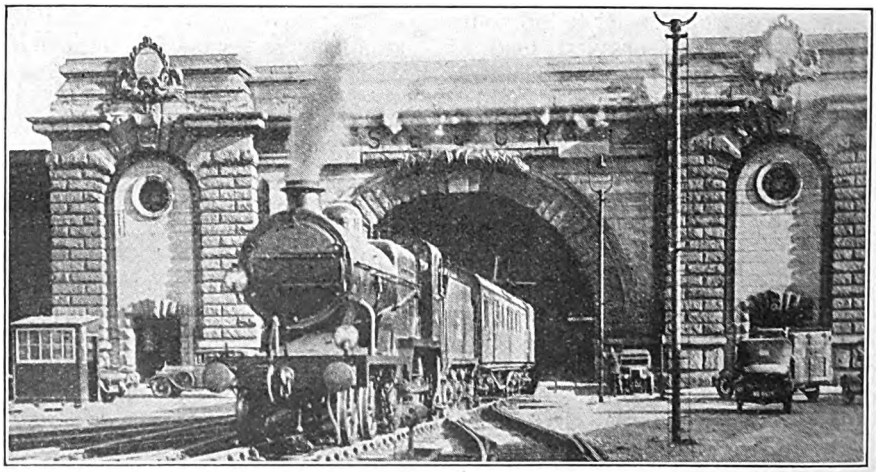

Photo.] **UP CONTINENTAL TRAIN LEAVING DOVER MARINE.** [*A. C. Wright.*
4-6-0 No. 783.

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log with no details of speeds. With a 12-coach train of 410 tons all told, the big engine maintained almost exact time throughout, and would have reached Salisbury to time but for the concluding signal check. But the running on the last-mentioned trip falls altogether short of the magnificent effort of the equally-loaded No. 773, *Sir Lavaine,* in the next column—another high-water mark of "King Arthur" achievement. The correspondent who recorded these times followed on with the remarkable run of *Sir Galahad* which concludes the Salisbury to Exeter table—a truly inspiring conjunction of runs for one day. The 10.40 a.m. Ilfracombe "relief" had the misfortune to be preceded to Worting by a string of Southampton boat specials, which accounted for the delays. But some of the unchecked times substantially beat those of all the other down runs, such as 20 min. 19 sec. for the 20.5 miles from Clapham Junction to Woking, and 15 min. 44 sec. from Hurstbourne to Woking—this with 410 tons. Unfortunately no intermediate speeds figure in the log, save the minimum of 48½ m.p.h. at Grateley, and the maximum of 76½ below Porton. My correspondent's net estimate

SOUTHERN RAILWAY—WATERLOO TO SALISBURY.

Distance.	Engine, 4-6-0 No. .. / ,, Name .. / Load (axles) .. / ,, (tons tare) .. / ,, (,, full) ..	Schedule.	778 K *Sir Pelleas*	862 N *Lord Collingwood*	850 N *Lord Nelson*	773 K *Sir Lavaine*	778 K *Sir Pelleas*	Schedule.	450 K *Sir Kay*	778 K *Sir Pelleas*	850 N *Lord Nelson*
	Load (axles) ..		36	36	48	48	52		44	44	48
	,, (tons tare) ..		279	284	389	389	403		356	356	384
	,, (,, full) ..		295	300	410	410	425		370	380	405
miles.		min.	m. s.	m. s.	m. s.	m. s.	m. s.	min.	m. s.	m. s.	m. s.
0·0	WATERLOO ..	0	0 00	0 00	0 00	0 00	0 00	90	86 50	87 15	86 00
1·4	Vauxhall	—	3 43	3 40	3 55	—	3 40	86	83 05	82 55	81 50
3·9	CLAPHAM JC. ..	7	7 19	7 00	7 20	7 13	7 25	82½	79 35	78 25	78 05
7·3	Wimbledon	—	11 18	10 50	11 05	10 53	11 40	—	76 15	74 25	74 20
12·1	SURBITON	—	16 49	16 00	16 15	15 48	17 00	—	71 25	69 50	69 50
19·2	Weybridge	—	25 33	24 15	24 00	22 32	24 20	—	65 00	63 20	63 10
24·4	WOKING	29	30 29	29 15	29 30	27 32	30 15	62½	60 25	59 20	59 10
28·1	Brookwood	—	34 03	32 55	33 40	34 29	35 00	—	57 25	56 30	56 15
31·0	*Mile-post* 31	—	37 08	36 05	—	39 00	39 05	—	—	—	—
33·3	Farnborough	—	39 17	38 20	39 35	41 38	41 40	—	52 45	52 05	51 45
36·6	Fleet	—	42 16	41 25	42 45	44 53	45 25	—	49 40	49 25	49 00
42·3	Hook	—	47 20	49 00	48 05	50 29	51 45	—	44 40	44 45	44 15
47·9	BASINGSTOKE ..	54	52 12	54 45	53 50	56 24	58 00	41½	39 45	40 05	39 50
50·4	*Worting Junction* ..	57	54 38	57 50	56 50	61 55	61 40	39	37 50	38 10	37 50
55·7	Overton	—	59 41	63 30	62 20	68 36	68 55	—	32 30	32 55	32 40
61·2	Hurstbourne	—	64 11	68 30	67 05	73 22	74 20	—	26 30	27 35	26 50
66·4	ANDOVER JC. ..	72	68 28	73 00	71 25	77 32	78 50	22	21 15	23 00	21 30
72·8	Grateley	—	74 39	79 10	77 30	83 22	85 10	—	15 50	17 50	16 10
78·3	Porton..	—	80 53	84 50	83 00	89 06	91 10	—	9 20	10 20	9 15
82·7	*Tunnel Junction* ..	87½	85 18	88 20	86 35	92 50	95 05	3	3 25	3 45	3 20
83·8	SALISBURY.. ..	90	87 52	90 10	91 15	94 50	97 25	0	0 00	0 00	0 00
83·8	Net times (min.) ..	90	85½	87½	89¼	87	97½	90	86¾	85	85½

K: "King Arthur" class. L: "Lord Nelson" class.

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of 87 min. seems to me, by comparison with the other runs, to be on the conservative side.

A 430-ton train proved rather too much for *Sir Pelleas,* which lost 7½ min. to Salisbury. By comparison with the other running of the same engine, however, it seems doubtful if the driver who officiated on this occasion could have been the same as previously. Speeds were 61 m.p.h. at Hampton Court Junction, 55 at Weybridge, 42 at mile-post 31, 58½ at Winchfield, 38 at Worting, 65 at Hurstbourne, 73 at Andover, 45½ at Grateley and 72 at Porton.

The three up journeys are typical of the high speeds so often now run on the up Western Division services of the Southern Railway, inwards from Basingstoke. They also bear testimony to the very remarkable improvement which has been effected in the working of fast trains into Waterloo, the one-time delays, especially between Clapham Junction and the terminus, appearing now to have been almost entirely eliminated. *Sir Kay* made a fine start to Andover, improving by ¾-min. on the tight schedule to this point. Andover was passed at 72 m.p.h., and speed fell to 54 m.p.h. up the sharp rise to mile-post 62½. From here the rate gradually accelerated to 62 up the gradual rise to Worting. Then came sustained speeds of 65 to 67½ m.p.h. from Basingstoke to Brookwood, followed by the higher maximum of 75 near Woking, and the rate continued at or above 60 m.p.h. to the slack for Clapham Junction. The 68.9 miles from Grateley Junction were run in 63¾ min., at an average speed of 64.8 m.p.h.

Sir Pelleas improved on these times in the next run, and that despite a very much slower start to Grateley—slower, indeed, by 2 minutes. This log is devoid of any maximum or minimum speeds, and suffers in consequence. It was after Grateley that the driver opened out, the most astonishing of his times being 9 min. 55 sec. for the 10.7 miles from Andover up to Overton. By Fleet *Sir Pelleas* was ahead of *Sir Kay,* and by Weybridge 1¾ min. ahead. The time of 19¼ min. from Basingstoke to Woking was the best of the three, and from Worting to Weybridge, 31.2 miles, the speed averaged 72.4 m.p.h. throughout. A time of 56 min. 35 sec. for the 65.5 miles from Grateley to Wimbledon—all but 70 m.p.h. throughout—was another brilliant feat. The signal checks at the Waterloo end were not severe, but when due allowance has been made for them, the net time of *Sir Pelleas* with 380 tons comes down to 85 min. from Salisbury to Waterloo.

Last of all we have the run of *Lord Nelson* with a train of just over 400 tons, distinguished by magnificent running for the whole distance. The times tie fairly closely with those of *Sir Kay* as far as Basingstoke, but then the bigger engine began to draw ahead, until all but 2 min. ahead at Wimbledon. But even so the running did not quite attain to that of *Sir Pelleas* in the preceding column. In this case again maximum and minimum speeds are missing from the log, but some high speeds must have been run, especially from Worting to Fleet, where the time of 11 min. 10 sec. for a distance of 13.8 miles represented an average rate of 74.1 m.p.h. The only delay experienced was a slight one outside Waterloo, and net time for the journey may be put at 85½ min.

It will be observed from the foregoing data that virtually every "Lord Nelson" feat is duplicated, if not improved on, by the best of the "King Arthur" runs, but, as I remarked in the early part of the article, it would be unwise to attempt to draw serious deductions from the comparison. The "Lord Nelsons" did not appear in any numbers on the West of England services until the heavy traffic of the summer was over, and even then time would be necessary for drivers, previously unfamiliar with these engines, to get used to their ways. Further, it is a fact, of which I have had authentication from more than one source, that "Lord Nelson" type locomotives have put up some wonderful performances during the past few months. For example, Driver Stickley, of Nine Elms, who was responsible for the test run of "King Arthur" No. 451, *Sir Lamorak,* when Salisbury was reached in 75 min. from Waterloo, recently drove No. 860, *Lord Hawke,* from Salisbury to Waterloo, with a train of 420 tons tare and, roughly, 450 tons full, in 79 min. This was with the "Atlantic Coast Express," after a very late start, and showed a gain of 11 min.

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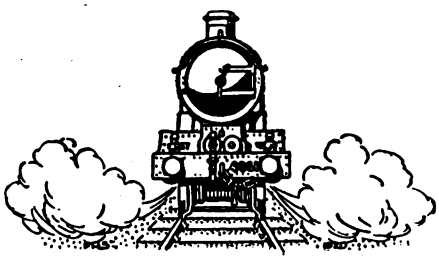
on schedule. From Exeter to London, the one engine working through, there was a gain of 14 min. in all, so that the actual running time throughout was only 174 min. With a tare of 484 tons—probably 510 to 520 tons full—No. 862, *Lord Collingwood,* passed Hampton Court Junction, 66 miles from Southampton West, in 65 min., but then, being before time, got delays into Waterloo.

Up to the present, from all accounts, the Western Division drivers have taken to the new engines more happily than their colleagues on the Eastern Division. One particularly successful driver on the Eastern Division has found it possible to work his "Lord Nelson" engine on the heaviest Dover boat trains, loading normally from 430 to 445 tons, and on occasion to as much as 468 tare tons, on 30 per cent. cut-off with full regulator on the ascents, including long stretches at 1 in 100, and from 14 to 10 per cent. with first regulator downhill and along the undulating stretch from Tonbridge to Sandling; other of the men fix their cut-off 37 to 40 per cent. or so and keep it at that, varying the regulator opening only, with the result that their running is inferior and their coal consumption is heavier. In this connection it is of interest to note that a well-known Nine Elms driver, who is a thorough-going believer in short cut-off working, went over recently with his engine to Battersea Shed in order to try his hand on the boat workings. It is to be hoped that such measures succeed in their object. In the "Lord Nelson" class 4-6-0 locomotives, ably backed up by the "King Arthurs," the Southern locomotive administration has provided the railway with an express locomotive stud of exceptional capability and efficiency, and the best of the locomotive work which has been described in this article need not fear comparison with any other in Great Britain, even up to and including, engine weight for engine weight, the best performances of the Great Western.

In conclusion, I have pleasure in acknowledging the receipt of letters from G. A. Field, P. N. D. Porter, R. Charles Ford (2), H. J. J. Griffith (2), A. J. Jones, G. E. Bishop, C. E. W. Neat, F. B. Stapleton, J. H. O. Young, T. Happé (Cambrai), M. M. Niven, Rev. J. H. Mortimer, S. P., J. M. R., "Tintagel" and "Old Pauline," whose communications I have read with considerable interest. I would only add that those who send logs for my scrutiny should take considerable care in the transcription of their figures. Some of those whose logs are reproduced in this article might well be surprised if they knew in how many cases I have had to correct palpable errors of a minute in the figures given, which might have been readily discovered by the senders had they taken the trouble closely to compare times with mileage. The omission of important summit points, also, such as mile-post 153½, is a serious blemish on some of the runs, and, yet again, the passing figures to the nearest second at the mile-posts or ½-mile-posts near the summit of the steeper inclines, where the trains were travelling slowly, would have given some idea of minimum speeds and enhanced the value of some of the runs sent in by readers who are not the fortunate owners of stop-watches.



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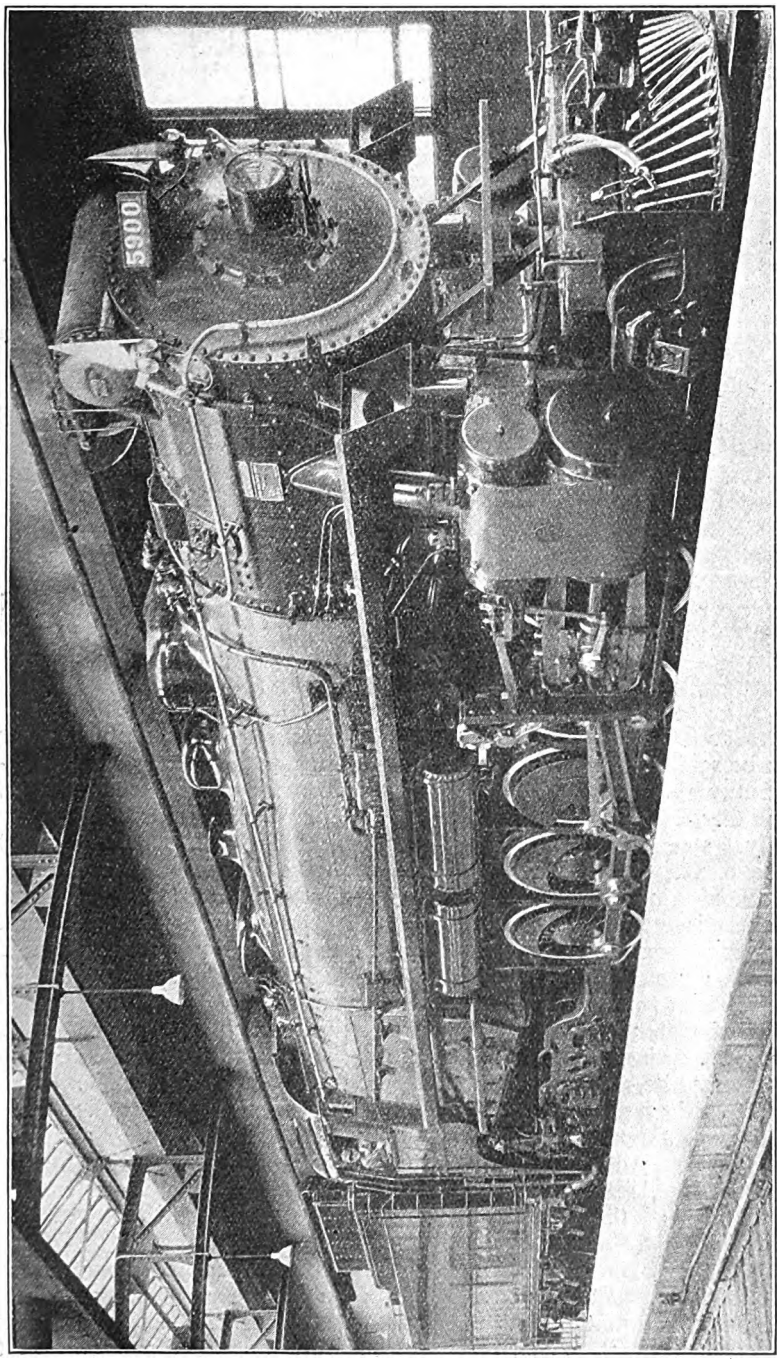
NEW 2-10-4 LOCOMOTIVE, CANADIAN PACIFIC RAILWAY.



A new class of 2-10-4 type locomotives has recently been placed in service on the Canadian Pacific Railway. The engines are booster equipped and their maximum tractive effort is 39 tons 16 cwt., with a factor of adhesion of 4.05. The total weight of engine and tender is 335 tons 18 cwt. Cylinders 25½ in. × 32 in.; wheels, coupled, 5 ft. 3 in. diam.; steam pressure, 275 lb. per sq. in.; heating surface, 7,043 sq. ft.; grate area, 93.5 sq. ft.; weight in working order, engine, 202 tons.

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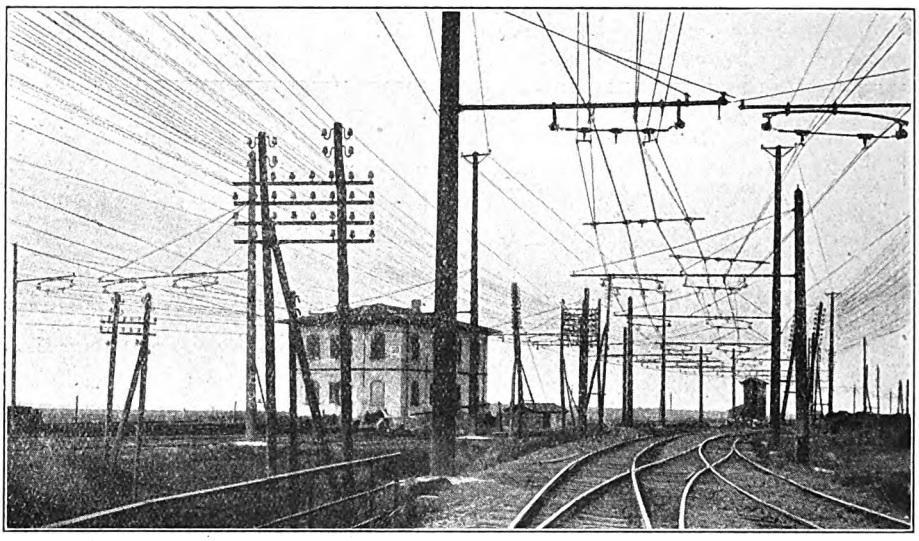

OVERHEAD CONSTRUCTION AT A CROSSOVER ROAD.

Railway Electrification in Italy [I.]

By THEODORE RICH.

OF all the countries in the world it can be said that Italy is in the forefront with regard to heavy electric traction. There is practically no native steam coal in that country, and beyond a little anthracite, some lignite and a certain quantity of exploitable peat, there is practically no fuel available for power raising, and no native fuel at all suitable for steam locomotive operation. There is available a very material amount of water power, much of which, however, owing to seasonal variations, can only be utilised with advantage with the aid of expensive storage dams. The strategic and economic desirability of being independent of foreign fuel supplies has led to an extraordinary development of the utilisation of water power. Although the proportion of the total water power now available which is used for railway traction is comparatively small, it is estimated that in 1925 the reduction in locomotive coal imports due to the use of such power was 325,000 tons. The continuous troubles in the collieries and the trade union demands and rules of surface workers, railwaymen and coal tippers at home have also given encouragement to the development of Italian water power, the amount of which, at work or under construction, for all purposes exceeds three million horse-power.

The physical features of Italy are such that the best features of electric traction can be developed in many places. Long tunnels, in which smoke becomes a danger to trainmen, abound in districts with steep gradients and sharp curves ; in many places single lines which could only be doubled at very great expense can now carry an increased traffic; the great increase in operating speed available on up grades and the increase on down grades through the use of electric braking are an important feature of electric traction.

The first section of standard gauge steam line to be electrified was between Milan to Varese, a distance of 45 miles, set to work on the direct current third rail system in 1901. This line carried an important passenger traffic, as it passed through an industrial district. The next section taken in hand was the Valtellina

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railway, from Lecco to Collico and Sondrio, with a branch to Chiavenna, 87 route miles, the line being in the neighbourhood of Lake Como. This line was electrified with the technical co-operation of Messrs. Ganz, of Buda Pesth, on the three-phase system, at 3,400 volts at 16-17 periods per second, two overhead conductors being used with the rails as the conductor for the third phase. This was the first high tension railway in the world. The ingenuity shown by the original designers of the apparatus used on this line has not been appreciated by many electric traction engineers, although many of the features have been imitated in other countries without acknowledgment. Such was the technical and operating success of this line installation that the same system was decided on for the electrification of the lines leading north out of the port of Genoa, and later for a number of sections in north-west Italy.

It might be noted that there are four systems of electric traction in general use in different parts of the world.

(1) The medium-pressure direct current system, operating at from 550 to 750 volts, the current being supplied through a third rail. This is the system in general use in England for suburban and underground traffic.

(2) The high - pressure direct current system from 1,250 to 4,000 volts. For example, the 1,250-volt system on the Manchester-Bury line at home is operated with a third rail, and an experimental section of the P.L.M. Railway in France, at 1,500 volts, has also a third rail; however, generally speaking, an overhead conductor for high-pressure direct current is used.

(3) The single-phase system, operating at pressures between 6,600 and 15,000 volts. This was used on the Brighton system at home, but there it has been dismantled in favour of the medium-pressure third rail. The system is used for heavy traction at about 16 periods in Switzerland, Austria, Central Germany and Sweden.

(4) The three-phase system. This was first used with a medium pressure on the branch between Bergdorf and Thun, in Switzerland, at 600 volts; in Europe, apart from a line through the Simplon Tunnel, the use of the high-pressure three-phase system is confined to Italy, although it has been adopted for the electrification of the Mountain Section of the Great Northern Railway, United States of America.

It cannot be said that any one system forms a sort of universal electric traction pill; no one system is the best for all situations; each system has advantages and disadvantages. One important feature of the three-phase system is its capacity for heavy, steady collar work, which makes it valuable where there are heavy loads to be hauled up steep grades. The apparatus is comparatively simple and rugged; the fact that the normal train speeds are fixed in steps and that the speed of the driving wheels is practically locked into the speed factors of the generating plant, whether going uphill or downhill, tends to make the operation to a material extent fool-proof.

The Port of Genoa is one of the most important shipping centres in the Mediterranean; it does trade with the Levante, the Far East, the Antipodes and the New World; in traffic it claims rivalry with Marseilles. It deals with trade not merely to Piedmont and Lombardy, but also with Switzerland and Central Europe, competing for such traffic with Lower Rhine ports and Trieste. A large proportion of the traffic, however, has to be hauled over the Giovi Pass through a range of hills that links up the Apennines with the Maritime Alps; the gradients are very heavy, up to 1 in 28.5, and long tunnels have to be negotiated, and, though there are alternative double-line routes, the difficulty of dealing with the tonnage that presented itself was so great with steam locomotives that the trade of the port was being seriously interfered with. Nearly twenty years ago it was decided that the electrification of the lines through this bottleneck was a matter of extreme urgency.

Part of this section and of lines to the north of it was electrified in 1911, and extended a few years later. In view of the fact that what was wanted on this section was maximum tractive effort within the allowable axle load, and not so much a question of speed, a series of locomotives was constructed of the 0-10-0 type, five coupled axles being driven by two gearless motors by means of cranks, connecting rods and coupling rods. It might be noted that crank-driven electric locomotives are used almost exclusively on the electrified sections of Italy. This type of locomotive, known as the Giovi type, or E550 type, has mechanical gear.

The 550 type weighs about 65 tons; the two motors are each of 1,000 horse-power, the running speeds being 15.5 and 31 miles per hour. When on heavy gradients, two locomotives, one at each end of a train of 500 tons, are able

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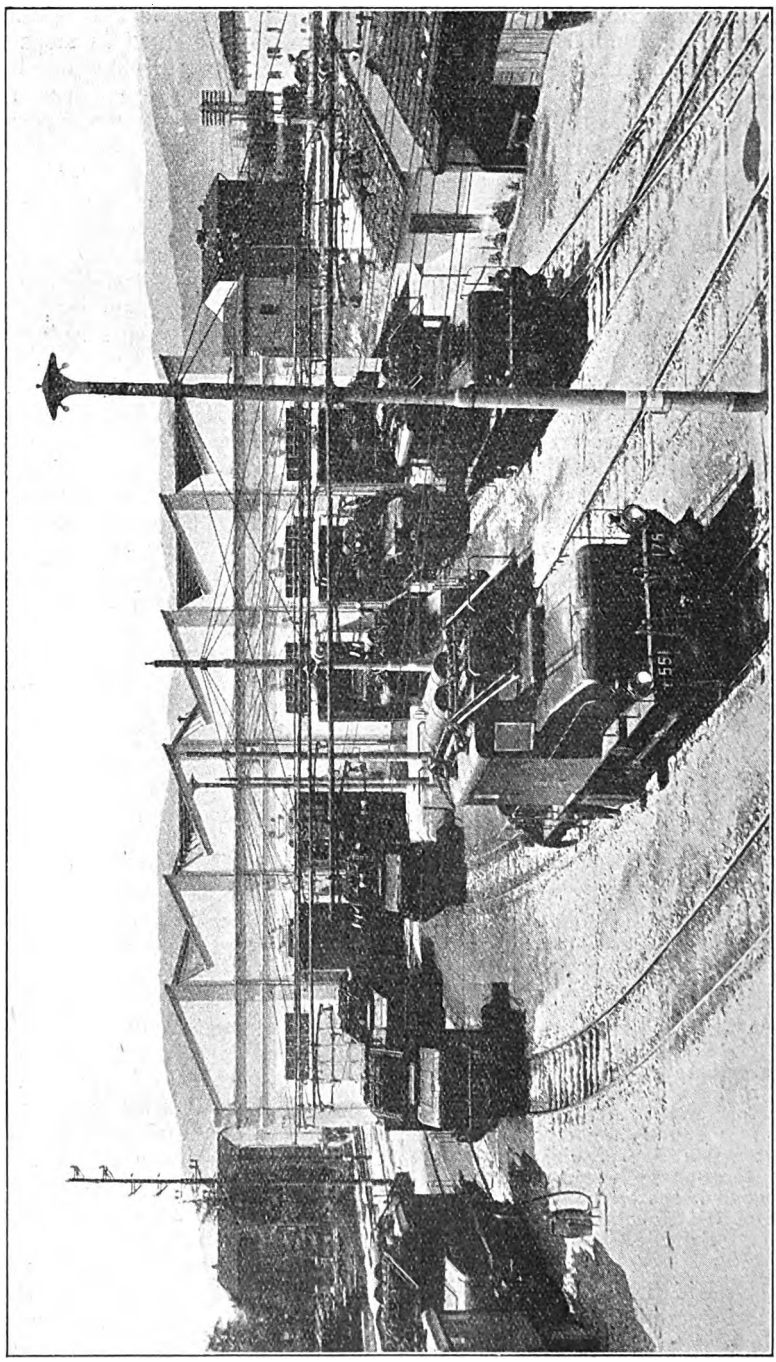

ELECTRIC LOCOMOTIVE SHED AT PISTOIA.

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to run up or down at 31 miles an hour. When running down hill a material amount of the power is returned into the electrical system.

The Giovi section was originally supplied from a steam power station in the port of Genoa, containing three turbo-alternators of 5,000 horse-power each at 13,500 volts, 16-17 periods, this pressure being stepped down at a series of sub-stations, which at points of heaviest loading due to the gradients are placed only a few miles apart. Later on power was supplied to the Giovi and adjacent sections from several water-power undertakings in the Alps, the above-mentioned station, which has been brought up to date recently, being only used in the winter months, when some of the rivers furnishing power are frozen.

The next section to be tackled was the railway between Modane, on the French side of the Mont Cenis Tunnel, and Bussoleno, on the line to Turin ; owing to numerous tunnels, the bad atmosphere in the long Mont Cenis Tunnel, the heavy gradients and certain single-line sections, traffic was being seriously limited under steam traction. This line was set to work on the three-phase system in 1915, current being supplied from a station close to the eastern mouth of the main tunnel at Bardonneccia, a favourite point for Italian winter sports. The electrification of this section proved of the utmost value during the war, when British troops and supplies were sent to the Near East. Before the war traffic over a single line out of the Port of Savona to the West of Genoa, was being impeded under steam traction ; this was taken in hand, and a number of links in the Piedmont basin were later electrified during and after the war, connecting up various points with Turin and Bussoleno. The main line along the south-west coast towards Rome was getting congested ; up to Spezia the Appenine Mountains run so close to the coast, with rocks down to the shore, that there is a long succession of tunnels, with some single-line sections ; starting from Genoa, this section was electrified, first to Sestri Levanti, then to Spezia, and recently along the more open coastal shelf to Carrara, famous for its marble, Pisa, noted for its leaning tower and baptistry, up as far as Leghorn, 112 miles from Genoa. From Modane to Leghorn we have now one of the longest electrical runs in Europe of 300 miles. All this work was done on the three-phase system. At the present moment the electrification of the important cross-country line from Bolognia to Florence and from Florence to Pisa is nearing completion ; a remarkable piece of work, a tunnel through the Apennines, is nearly completed, which will shorten the distance between the two former and lower the summit to be crossed by several hundred feet. Except where the basin of the Po widens out into the Adriatic the backbone of mountains in Italy stretch out to the coast on both sides, so that the main railways north and south lie on the east and west coast respectively, the cross-country lines having to wind over the mountains with steep gradients ; where water power is available and the traffic is congested, such lines lend themselves to electric traction. Up to date nearly 600 miles of route on the State Railways have been electrified, with about 1,200 miles of track and sidings. The policy of the authorities has been to buy the bulk of the current they require from different power companies and to link up the supply points with 60,000-volt electrical trunk lines. At present the State Railway authorities own 1,300 miles of such electric mains. Most lines are operated at 16 periods, whereas the industrial current supplies are at 42, 45 and 50 periods ; some of the supply companies specially generate current at 16 periods, others supply through rotating frequency changers. At Torre-del-Lago, near the town of Lucca, renowned for its olive oil, is to be found a basin of waterlogged peat ; a company excavates this with electrically-driven grabs, and uses it in a power station, partly as pulverised fuel and partly through gas producers, with reclamation of bye-products, such as sulphate of ammonia ; the power generated being supplied to the State Railways. Torre-del-Lago is noted as the residence of the celebrated opera composer, the late Signor Puccini. The sub-stations, which reduce the pressure from 60,000 volts to 3,600-4,000 volts, are placed along the line at distances from 3 to 20 miles, according to the traffic and gradients. In order to be able to supply current during the building of sub-

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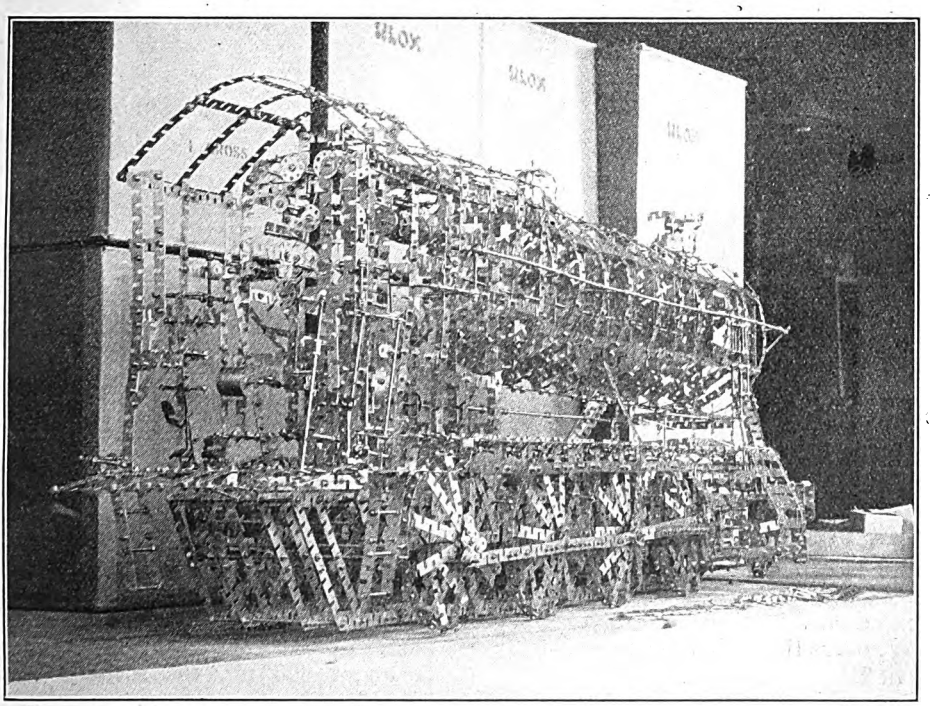
stations, to allow the spare plant to be reduced, and to enable temporary traffic rushes to be dealt with, a number of portable sub-stations on trucks have been provided, which can stand in a siding alongside the trunk mains and pump extra electrical supplies on to the track circuits when required. In the district to the east of Rome a line has been equipped for electrical operation with current of industrial frequency of 45, at 10,000 volts three-phase; a railway from Foggia, on the Brindisi line, to Benevento, not far from Naples, 102 miles long, is being equipped with direct current at 3,000 volts. The general policy has been decided on that direct current is to be adopted in the south for traction.

(To be continued.)

A REMARKABLE LOCOMOTIVE MODEL.



The photograph reproduced above is sent by Hommade, Limited, of Enfield Road, Acton, London, W.3, and shows a rather remarkable model of a locomotive constructed by a member of their staff from their new product "Ulox" and shown at the Ideal Homes Exhibition.

The model measures 64 in. in length, is 24 in. high and 17 in. wide, and the materials employed are standard "Ulox" parts as sold in this firm's sixpenny outfits. The engine is a 2-8-0, and is complete with valve gear, working hand brake and various fittings. The firm also send a copy of the first issue of the *Ulox Mechanical Magazine for Boys.*

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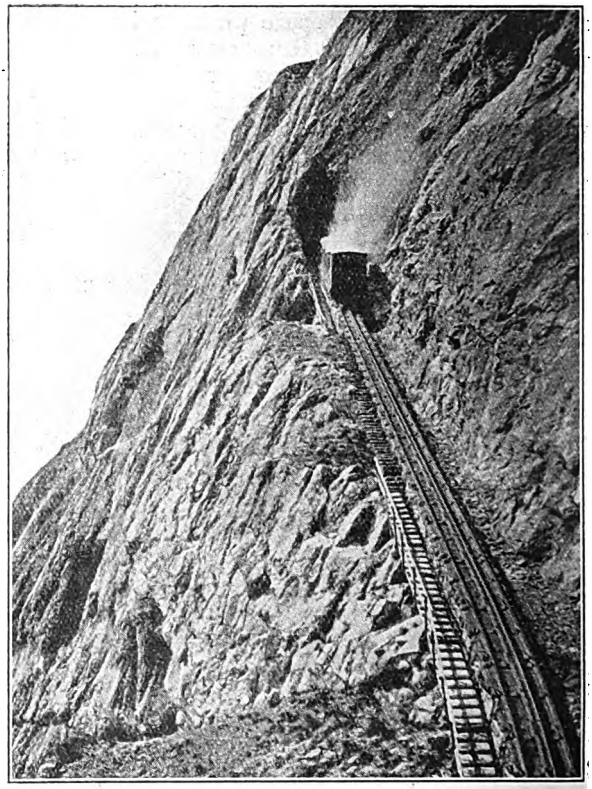
The Mount Pilatus Rack Railway.

By A. J. C.



TUNNEL ON STEEPEST PART OF MOUNT PILATUS RAILWAY.

AMONG the varied attractions which Lucerne has to offer to its visitors, the Mount Pilatus Rack Railway occupies the place of honour.

The railway, which has its lower terminus at Alphachstadt, a pretty little village about 8 miles from Lucerne, was constructed during the years 1886-88 by Locher & Co. and M. Guyer-Freuter, of Zurich. The system, the invention of Messrs. Locher, was put into practice for the first time.

The line has a length of 4·6 km., and is laid to a 2-ft. 7½-in. gauge. The rails are flat-bottomed, and are bolted to a road-bed of granite; midway between these rails is the rack rail, which has teeth on each side of it. There are three bridges and seven tunnels. Gradients are extraordinarily steep, the average rise being no less than 1 in 3, while the steepest is 1 in 2.

The vehicles using the line are self-propelled by steam, the engine and carriage being placed on the same frame, which runs on four wheels, whilst two pairs of horizontal cog wheels work on each side of the centre rail.

Control over the vehicle is assured by three separate sets of brakes—two worked by hand, an atmospheric one acting on the piston, and an automatic brake which comes into action when the speed exceeds 3 m.p.h. As an additional precaution against the violent storms which sometimes burst upon the mountain, the car is provided with a clip encircling the head of each rail. Accommodation is provided for 32 passengers, and by an ingenious device the seats adjust themselves to any change of incline.

The journey in either direction occupies about an hour and a quarter. Leaving Alphachstadt (440 m. above sea level), the line runs through orchards and pasture lands; but on attaining a height of about 800 m., the scenery becomes rugged and mountainous.

At 1·3 km. is the Wolfort power house, which supplies the hotel at the summit with water and electricity. Spanning the Wolfort ravine, the line enters a tunnel to continue its course within full view of the lake below. The views here are superb.

Soon after this, Aemsigen, the only crossing station on the line, is reached. Here is another power house. The station is situated at a height of 1,350 m.

The line now ascends the western side of the mountain, passing through several

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tunnels, and finally enters the terminus of Pilatus Kuhn, 2,070 m. above sea level. Here is an excellent hotel, open all the year, and possessing magnificent views. On a clear day objects 25 miles away can be perceived, while mountains can be seen up to a distance of 50 miles. Lucerne and neighbourhood lie stretched out like a map.

The trip is especially popular by reason of the excellent views of the sunrise and sunset, the effect of the sun on the snow-clad peaks being very attractive.

A line similar to this ascends Monte Generoso on the Lake of Lugano, and from the summit very fine views of the lakes and the plains of Lombardy are obtainable. The line, however, has none of the gradients found on the Pilatus.

As a matter of historical interest, a runway for the timber on the Pilatus was in use many years before the railway was built; it was constructed by an engineer named Rnepp, and had a length of some 45,000 ft.—about 8 miles—during which it descended 5,000 ft. A tree launched at the top reached the Lake of Lucerne in 2½ minutes!

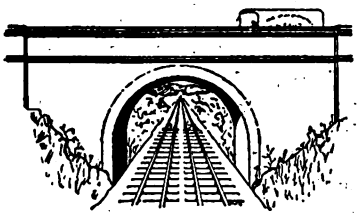
MR. J. ABRAM,

STATIONMASTER, EXCHANGE STATION, LIVERPOOL, L.M.S.R.

The portrait reproduced is one we were unable to include in the article on this station in last month's issue; but we have pleasure in giving it now.

In the article it was stated that the booking offices were under the charge of Mr. W. Hayes. They are now, however, under the oversight of Mr. J. Abram.

Exchange Junction Signal Box was described as Exchange Station Box.



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The Main Line Gradients of British Railways.

XVI.—GREAT WESTERN RAILWAY. PADDINGTON TO PENZANCE, WITH BASINGSTOKE, WEYMOUTH AND TORQUAY BRANCHES.

By "VOYAGEUR."

THERE is no main line in Great Britain which can rival that of the Great Western Railway from Paddington to Penzance in the violence of the contrasts that it offers between the relative steepness of grading of its two ends. The first 36 miles of the route form part of Brunel's original main line up the Thames Valley, and beyond a purely nominal inclination of 1 in 1,320—4 feet to the mile—this initial stretch is perfectly level. At the other end of the journey, or, indeed, before the end, we have the heaviest grades in the British Isles (with the possible exception of the Lickey Incline on the L.M.S., which is subject to special methods of working) over which high-speed express passenger services are worked. The ascents from Newton Abbot and Totnes up both sides of Dainton Summit, from Totnes westbound up to Rattery and from Plympton eastbound up to Hemerdon, carry the main line across the deeply-indented southern slopes of Dartmoor at inclinations of 1 in 50, 1 in 42, and, for short strips on both sides of Dainton, 1 in 36 and 37. To negotiate such contrasts in the course of a single non-stop run, as does the "Cornish Riviera Express" on the 225¾-mile summer non-stop schedule from Paddington to Plymouth, is an extraordinary experience indeed. The continuation of the same main line through Cornwall is throughout of exceptional difficulty, which by many readers will be seen in its correct perspective for the first time by the presentation of these profiles to a scale which continues to be uniform throughout the series.

We may now look at the route in detail. The section from Paddington to Reading is so perfectly level as to require no comment, save in regard to the fact that even so extremely slight an inclination as 1 in 1,320—4 feet to the mile—has its influence on the speed of fast trains, according to whether it is up or down. Thus, in normal running, the highest speeds east of Reading are usually attained at Slough, as the fruit of the 1 in 1,320 grades which converge downwards at this point. It will be seen that recent regrading of the main line has steepened the 1 in 1,320 through Sonning Cutting to 1 in 892 for a mile.

Reading Main West Junction, at the west end of Reading station, by which trains are diverted to the Westbury route, has been relaid with the latest track equipment, including movable diamond crossings, and permits of a speed of 40 m.p.h., though even this involves a substantial reduction of the rate at which Reading is generally approached. The sharp curve over Southcote Junction, 2 miles later, entails another speed reduction, so that speed is usually kept at a moderate figure in both directions between the two junctions. Trains passing from north to south, such as the Birkenhead-Bournemouth expresses, travel over these metals from Reading West Station to Southcote Junction, and the gradients of the Basingstoke branch, over which they continue, are reproduced, as well as the mileage from Reading West Junction—on the Bristol main line between Reading and Tilehurst—to enable readers to follow the journey of these trains throughout.

From Southcote Junction West of England trains pass on to the old Berks and Hants line, up the Kennet Valley. This line has now been re-levelled, and readers who possess the original RAILWAY MAGAZINE series of articles of 1903 will see that the present gradients differ almost *in toto* from those previously given. With one or two short exceptions, the gradients, though unbrokenly "against the collar"

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in the westbound direction, for the 31 miles onwards from mile-post 39, are very easy save in the final 3 miles ; indeed, it is only the last $\frac{5}{8}$-mile to Savernake which could be regarded as steep. Similarly, up to Savernake from the west, steepness is confined to a single half-mile east of Burbage Box, though the $5\frac{1}{2}$ miles at 1 in 222 between Patney and Edington make hard work for fast and heavy up trains. From Patney to Westbury the route follows one of the two new cut-off lines which were made before the opening of the Westbury route in 1906 ; the original Berks and Hants line, single from this point, proceeds northwards from Patney *via* Devizes. The slacks indicated at Midgham and Hungerford are nominal only, a maximum of 60 m.p.h. being enjoined.

Between Westbury and Castle Cary the grades steepen considerably, and the service slacks at Westbury and Frome, though both to 30 m.p.h., are a considerable hindrance, in view of the high speeds at which otherwise both these stations would be passed. Powers have now been obtained, however, to make deviation lines at both towns, which will cut these slacks out entirely. From Westbury to Castle Cary the route followed is that of the old Weymouth line, which left the Bristol main line at Thingley Junction, Chippenham, and the mile-posts, including the famous " $122\frac{3}{4}$ " mile-post at Brewham Summit (which was once dignified, like Sharnbrook Summit on the London Midland and Scottish, with express train passing times in the working book), are by the latter route. The approach grades to Brewham are but moderate from the east, save in the last 2 miles, but the last 5 miles from the west are difficult, including as they do over 3 miles at 1 in 80 to 98, with level intermissions.

Both over the Berks and Hants line between Reading and Patney, and again between Westbury and Castle Cary, there is a good deal of reverse curvature, and exceptionally high maximum speeds are not often attained between Reading and Taunton, save at the foot of Lavington bank, on the Lavington cut-off, and occasionally in descending from Brewham to Castle Cary. At the latter station the speed reduction for down trains is the purely nominal one of 60 m.p.h. The second " cut-off," from Castle Cary onwards, brings the Westbury route back into Brunel's old West of England route at Cogload Junction, 5 miles short of Taunton. It is well-graded, nowhere exceeding 1 in 264 in steepness, and is chiefly in favour of down trains. Cogload is another magnificently-laid junction, with movable diamonds, which can be taken at high speeds by trains to and from both the Westbury and the Bristol directions, though in the facing direction to Westbury a limit of 50 m.p.h. is enjoined.

At $141\frac{1}{2}$ miles there begins the climb through the Blackdown Hills, which continues for $12\frac{3}{4}$ miles. It does not begin to be appreciably steep, however, till Victory Siding (146 miles) ; from $147\frac{3}{4}$ to $149\frac{3}{4}$ miles it averages 1 in 172 ; and then from $150\frac{1}{2}$ to 153 miles it is for $2\frac{1}{2}$ miles continuously at between 1 in 90 and 80 ; finally, for $\frac{1}{2}$-mile through Whiteball Tunnel, it flattens to 1 in 127. This is a tough proposition for heavy down expresses. Beyond the 2 miles at 1 in 115 past Burlescombe and the $1\frac{3}{4}$ miles at 1 in 155 from Tiverton Junction, the western approach is considerably easier, and there are three short and welcome " breathers "—between Stoke Canon and Silverton, to Hele, and past Silverton—which are of assistance to up trains.

Trains passing St David's Station at Exeter, on the down through road, have no slack, but speed must be severely reduced if slip coaches are to be detached on the platform line. At a distance of $2\frac{1}{2}$ miles from here, the dead level is reached which continues along the right bank of the Exe estuary, and subsequently along the sea-coast, as far as Teignmouth and onwards to Newton Abbot. But very sharp curvature, beginning at Starcross and continuing to well beyond Teignmouth, drastically reduces the maximum speeds along this length.

After $1\frac{1}{2}$ miles gently rising from Newton Abbot, there comes the extraordinary " gable " of Dainton—the more amazing, indeed, by comparison with the perfectly level stretch which has immediately preceded it. Opportunity was taken, in rebuilding Newton Abbot Station, to straighten out the main line, so that the speed restriction has now been raised to

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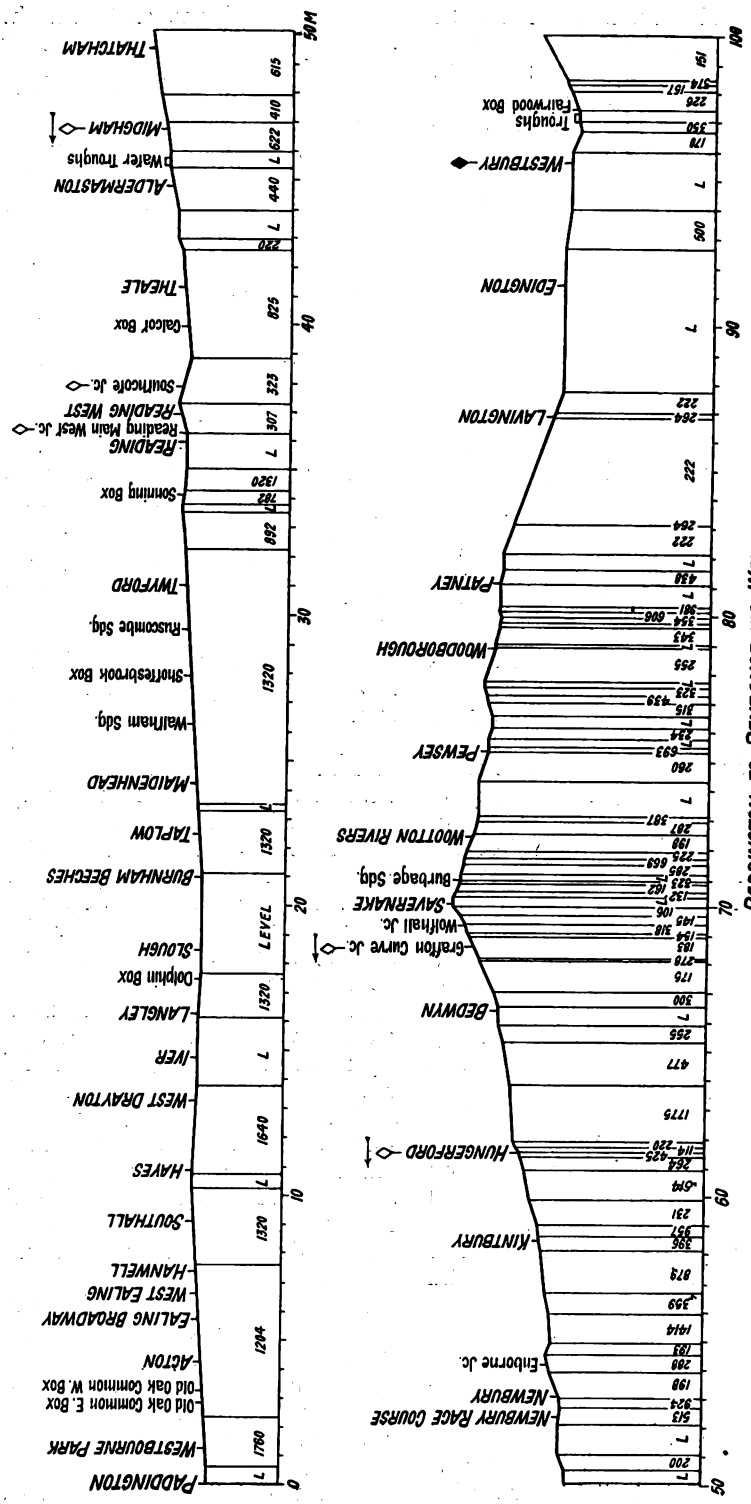

GRADIENT PROFILES, WEST OF ENGLAND MAIN LINE VIA WESTBURY, PART 1.

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30 m.p.h.; non-stopping trains therefore have an opportunity of getting to well over 50 m.p.h., on passing Aller Junction, before tackling the climb. The bank proper begins at the 215½ mile-post, and finishes at 217¾ miles, the post indicating which is, however, just inside the tunnel ; Dainton Box, which should on no account be missed by timers, is precisely opposite the 218 post ; these posts are, of course, miled from Paddington by the old route *via* Bristol. The crucial stage of the ascent is from mile-post 216, beginning at 1 in 57, and then steepening to 46, 41, 49 and a short section actually at 1 in 36 before the final 1 in 44 is reached. The west side, downwards, starts at 1 in 37-43-38-55 for over a mile before the grade flattens to 105, 76, 260 and finally to level at the 219¾ post. After that, a further 1½ miles of fairly steep grades lead from the 220¼ post to the Dart Valley near Totnes ; but the western approach to Dainton is not so severe in its grading as the eastern.

From Totnes, Rattery bank provides another mountainous ascent—much longer but not quite so severely graded. For all that, the 2¾ miles from post 223 to post 225½ (Tigley Box) are very hard, averaging but a shade easier than 1 in 50 ; and the next 1¾ miles, mostly at 1 in 90 or so, but concluding at 1 in 65 to Rattery Box, are none too easy. If this were not enough, there is the long subsequent rise to Wrangaton, the summit, of which 2 miles are steeper than 1 in 200, the complete ascent from Totnes being 8¾ miles in length. Passing times should be noted at both Tigley and Rattery boxes, both of which mark important changes in the grading of Rattery bank.

The subsequent descent, to beyond Plympton, is 11½ miles long, but only 1¼ miles are as steep as 1 in 100 to 200 until Hemerdon Box (another important timing point) is reached. For just over miles (between the 239½ and 241¾ mile-posts) Hemerdon bank averages 1 in 42, and is the terror of up trains, especially in the autumn, when falling leaves from the adjacent woods tend to make the rails greasy. It is an undoubted triumph for the capability of Swindon locomotives that the 4-6-0 " Kings " are permitted to take no less than 375-ton tare loads without assistance over Hemerdon, Rattery and Dainton Summits. The run into Plymouth concludes with a sharp rise up 1½ miles at 1 in 72-83 to Mutley Tunnel, and, in the case of trains making for Millbay Terminus, a drop for ½-mile at 1 in 61-65—a fitting termination to 32 miles of almost unexampled difficulty for a main line over which fast running is scheduled. It may be added that constant and severe reverse curvature throughout this distance effectually prevents the attainment of any high downhill speeds.

The Cornish main line, from Plymouth to Penzance, partakes, for the whole of its length, of the same character, though not showing any gradients quite equal in severity to those just described. But inclinations of between 1 in 60 and 1 in 80 abound. The chief summit points are found at Doublebois and Redruth, both of which are but little short in altitude of the height attained on the southern slopes of Dartmoor at Wrangaton, and other notable " gables " are at Burngullow and Grampound Road. Of the banks, the longest and most severe are the 8 miles down westwards from Doublebois (including 3½ miles at 1 in 58 to 71) ; the 5 miles from Par Harbour Box up past St. Austell (half of which are at 1 in 60-64) ; the 2½ miles down from Grampound Road to Probus, mostly at 1 in 67 ; the climb from Truro to Scorrier, including 3 miles at 1 in 80 continuously, and a mile at 1 in 65-90 ; and lastly the broken descent from Camborne to St. Erth, with over 2 miles averaging 1 in 61 and 1½ at 80 or so. It is worth noting that of the 107 miles of the West of England main line from Aller Junction to a point 3 miles short of Penzance, 29 miles in all, or 27 per cent., are at gradients of 1 in 75 or steeper, while a total of 53 miles, or almost precisely one-half, is at 1 in 100 or steeper grades. Many moderate service slacks, mostly to 40 or 45 m.p.h., are indicated on the profile, and help further to restrict over-all speeds to a comparatively low figure.

One hindrance to traffic working west of Plymouth is shortly to be removed by the doubling of the single-line section between Scorrier and Drump Lane Box at Redruth. The only piece of single line then remaining will be the ½-mile over the Royal Albert Bridge to Saltash, which is likely to remain single until, if ever, the

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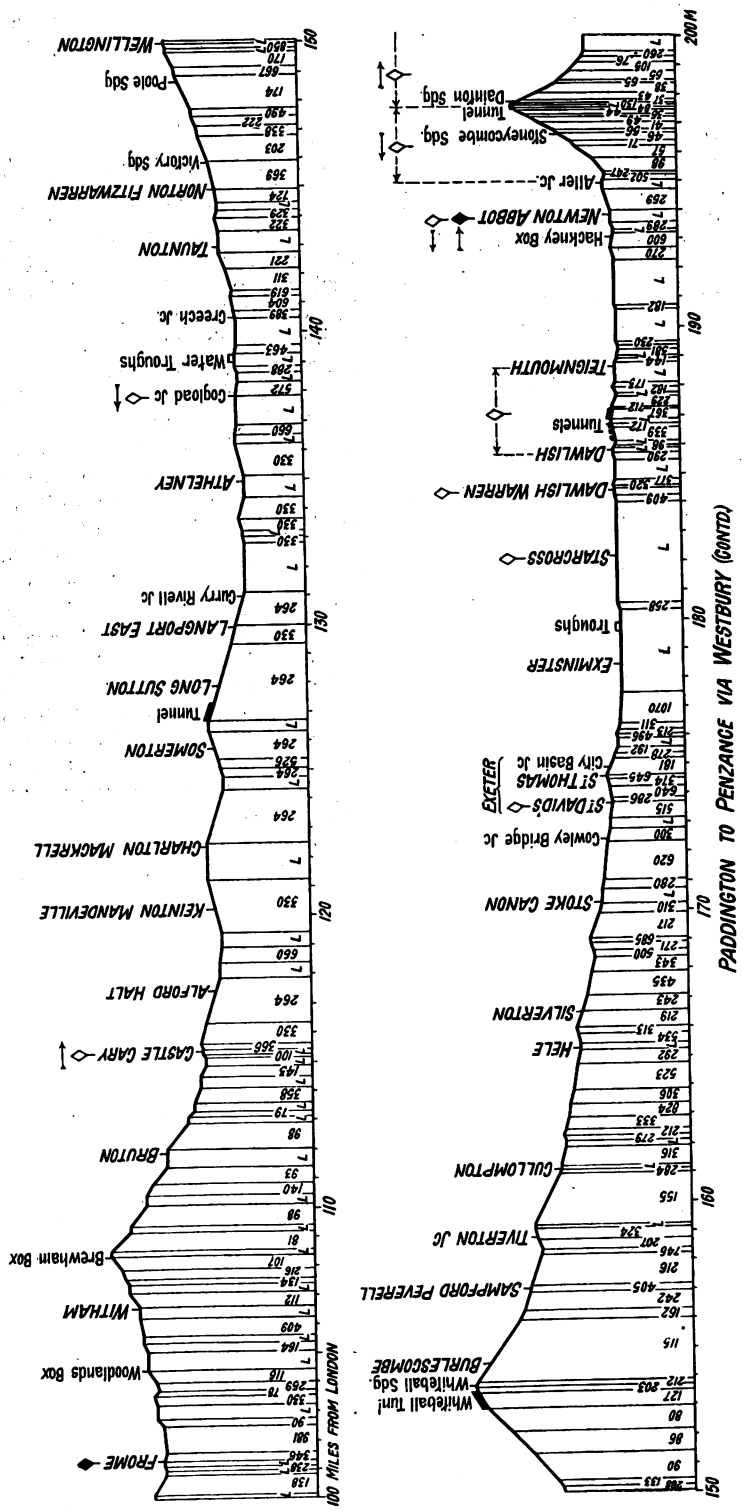

GRADIENT PROFILES, WEST OF ENGLAND MAIN LINE VIA WESTBURY, PART 2.

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bridge is replaced by a more modern structure.

CASTLE CARY TO WEYMOUTH.

The heavy grades of the Weymouth branch are confined to the 27 miles between Yeovil and Weymouth Junction. The last 3 miles of the ascent to Evershot from the London direction are terribly steep, increasing in severity from 1 in 75 to 2¼ miles mostly at 1 in 51. After the first 2¾ miles of the subsequent descent—at 1 in 69-150—there comes a level stretch, and then 2½ miles further fairly steeply down (1 in 118-146) past Grimston. But much the worst bank facing up trains is the start out of Weymouth; this is 3¾ miles long, and includes 1¾ miles at 1 in 51 as well as 1¼ miles at 1 in 74. From the Dorchester direction the descent is approached by a sharp rise, for 1½ miles at 1 in 91, to Bincombe Tunnel Box, which crowns the apex of the "gable."

NEWTON ABBOT TO TORQUAY AND KINGSWEAR.

This is another of the extremely difficult branches thrown off by the West of England main line of the G.W.R. The ascent from the divergence at Aller Junction hardly rivals Dainton; it is for 2 miles at 1 in 110. But then follows a precipitous descent into Torquay, steepening during its 1½ miles' length from 1 in 73 to 1 in 55, which makes a particularly bad start for up trains. For ¼ mile in the town direction from Torquay, also, there is a 1 in 57 rise. There is then the 2-mile bank from Goodrington Sands nearly to Churston, at 1 in 71 and 60, and last of all the 2¼-mile drop into Kingswear, of which the major part is inclined at 1 in 66.

DISTANCES.

PADDINGTON TO PENZANCE.

Mile-posts, up side throughout; Paddington zero) to Westbury; Westbury to Castle Cary rom zero at Paddington via Chippenham; Castle ary to Cogload from zero at Paddington via lewbury; Cogload to Penzance from zero at addington via Bath and Bristol. The series st mentioned is carried into and out of the illbay Station at Plymouth.

	Miles.
ADDINGTON	0·0
estbourne Park	1·3
ld Oak Common West Jc. (down)	3·3
cton	4·3
ALING BROADWAY	5·7
West Ealing	6·5
Hanwell	7·4
SOUTHALL	9·1
Hayes	10·9
West Drayton	13·2
Iver	14·7
Langley	16·2
Dolphin Box (up)	17·5
SLOUGH	18·5
Burnham Beeches	21·0
Taplow	22·5
MAIDENHEAD	24·2
Waltham Siding (down)	26·3
Shottesbrook (down)	27·9
Ruscombe Siding (down)	29·5
Twyford	31·0
Sonning (down)	34·1
READING	36·0

	Miles.	
Reading West Jc. (down)	0·0	
Reading West	0·6	36·9
Southcote Junction (down)*	1·6	37·9
Mortimer	6·9	
Bramley	10·2	
BASINGSTOKE	15·2	
Calcot (down)		39·9
Theale		41·3
Aldermaston		44·8
Midgham		46·8
Thatcham		49·6
Newbury Race Course		52·4
NEWBURY		53·1
Enborne Junction (down)		54·2
Kintbury		58·5
Hungerford		61·5
Bedwyn		66·4
Grafton Curve Jc. (down)		68·6
SAVERNAKE		70·1
Wootton Rivers		72·5
Pewsey		75·3
Woodborough		78·9
Patney and Chirton		81·1
Lavington		86·9
Edington and Bratton		91·4

	Miles.	
CHIPPENHAM	¶94·0	
Thingley Jc. (down)	96·1	
Lacock Halt	97·2	
Beanacre Halt	99·0	
Melksham	100·2	
Holt Jc.	102·7	
Bradford North Jc. (up)	104·1	
TROWBRIDGE	105·7	
WESTBURY	109·8	95·6
Fairwood Crossing (up)	111·7	97·5
Frome	115·5	101·3
Woodlands (down)	118·7	104·5
Witham	120·8	106·6
Brewham (down)	122·6	108·4
Bruton	126·1	111·9
CASTLE CARY	129·6	115·4
Sparkford	134·4	
Marston Magna	137·0	
YEOVIL (PEN MILL)	141·4	
Yetminster	145·6	
Evershot	150·0	

* Up side of Basingstoke branch.
¶ Mileage from Paddington *via* Swindon.

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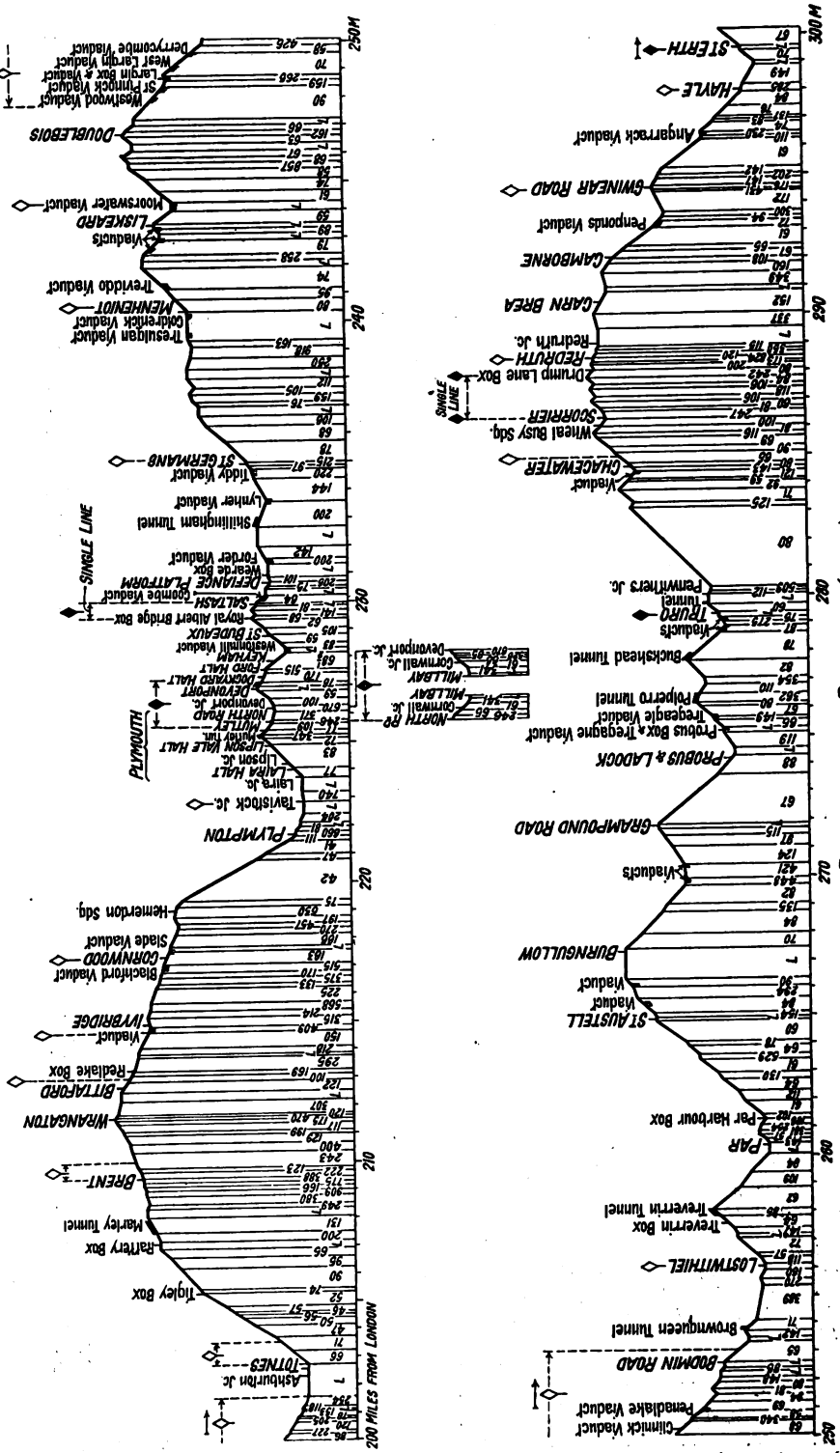

GRADIENT PROFILES, WEST OF ENGLAND MAIN LINE, PART 3.

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	Miles.	
Maiden Newton	154·1	
Grimstone	157·7	
DORCHESTER	161·8	
Dorchester Jc. (up)	162·2	
Monkton Halt	163·1	
Bincombe Tunnel (up)	164·4	
Upwey Wishing Well Halt	165·2	
Upwey Junction	166·4	
Radipole Halt	167·7	
Weymouth Jc. (up)	168·4	
WEYMOUTH	168·8	
Alford Halt		117·5
Keinton Mandeville		120·2
Charlton Mackrell		122·4
Somerton		125·7
Long Sutton and Pitney		127·9
Langport East		129·9
Curry Rivell Jc. (down)		131·0
Athelney		134·9
Cogload Junction (up)		137·9
Creech Junction (down)		140·5
TAUNTON		142·9
Norton Fitzwarren		144·9
Victory Siding (up)		145·9
Poole Siding (up)		148·6
Wellington		150·0
Whiteball Siding (down)		153·8
Burlescombe		154·5
Sampford Peverell Halt		157·1
Tiverton Junction		158·8
Collumpton		161·1
Hele		165·3
Silverton		166·5
Stoke Canon		170·3
Cowley Bridge Junction (up)		172·4
EXETER (ST. DAVID'S)		173·7
St. Thomas		174·6
Exminster		178·5
Starcross		182·2
Dawlish Warren		184·2
Dawlish		185·9
Teignmouth		188·7
Hackney (up)		193·0
	Miles.	
NEWTON ABBOT	193·8	193·8
Aller Junction (down)	194·9	194·9
Kingskerswell	196·2	
Torre	198·9	
TORQUAY	199·7	
PAIGNTON	201·9	
Goodrington Sands Halt	202·6	
Broadsands Halt	203·9	
Churston	204·8	
KINGSWEAR	208·6	
Stoneycombe (up)		196·6
Dainton (down)		197·8
Ashburton Jc. (up)		202·4
Totnes		202·6
Tigley (up)		205·3
Rattery (down)		207·1
Brent		209·4
Wrangaton		211·6
Bittaford Halt		212·7
Redlake (down)		213·3
Ivybridge		214·9
Cornwood		217·3
Hemerdon (up)		219·0
Plympton		221·7
Tavistock Jc. (up)		222·9

	Miles.	
Laira Junction (down)		223·8
Laira Halt		224·0
Lipson Junction (down)		224·2
Lipson Vale Halt		224·9
Mutley		225·4
PLYMOUTH (NORTH ROAD)	225·7	225·7
MILLBAY	226·6	
	0·0	
Devonport Jc. (up)	0·8	226·2
DEVONPORT	1·5	226·9
Dockyard Halt		227·3
Ford Halt		227·6
Keyham		227·9
St. Budeaux Halt		228·8
Royal Albert Bridge (up)		229·4
Saltash		229·9
Defiance Halt		230·7
St. Germans		235·0
Menheniot		240·4
LISKEARD		243·5
Doublebois		246·8
Bodmin Road		252·6
Lostwithiel		256·0
PAR		260·4
ST. AUSTELL		264·9
Burngullow		267·3
Grampound Road		271·8
Probus and Ladock Halt		274·1
Probus		275·1
TRURO	279·4	279·4
Penwithers Junction (†down)	280·0	280·0
Perranwell	283·6	
Penryn	287·8	
Penmere	289·8	
FALMOUTH	291·2	
Chacewater		284·6
Scorrier		286·3
Drump Lane (up)		288·0
REDRUTH		288·4
Carn Brea		290·5
Camborne		292·1
Gwinear Road		294·6
Hayle		298·0
St. Erth		299·6
Marazion		303·3
Ponsandane (down)		304·5
PENZANCE		305·2

Note: To	Distances from Paddington. Via Bath & Bristol (Temple Meads).	Via Bath & Bristol (Relief Line).	Via Badminton & Bristol (Temple Meads.)
	Miles.	Miles.	Miles.
Taunton	163·1	162·8	162·4
Exeter	193·9	193·6	193·2
Newton Abbot	214·0	213·7	213·3
North Road, Plymouth	245·9	245·6	245·2
Penzance via Millbay	326·6	326·3	325·9

† Up side of Falmouth branch.

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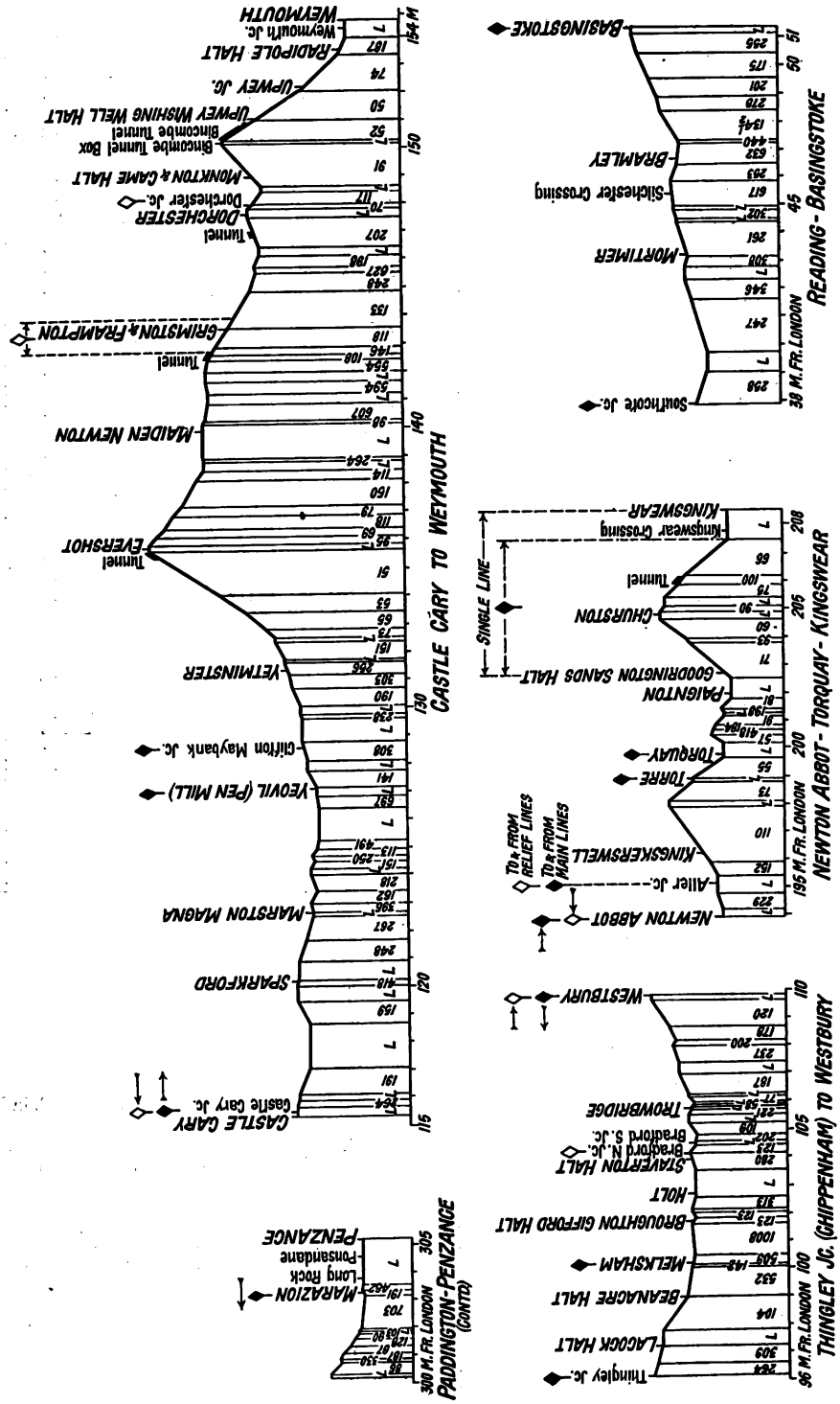

GRADIENT PROFILES, WEYMOUTH, TROWBRIDGE, TORQUAY AND BASINGSTOKE LINE.

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	Miles.
Paddington to Weymouth *via* Newbury	154·6
Paddington to Taunton *via* Chippenham and Westbury	157·1

In last month's instalment it was stated, by an inadvertence, that the mile-posts between Red Hill Junction and Pontypool Road, on the North to West line, are miled from a zero at Barr's Court Junction, *via* Barton. This is incorrect, as the zero point is now Rotherwas Junction, whence the posts are carried round the 2-mile spur to Red Hill Junction (which has now been taken over from the L.M.S. by the G.W. Company) and on from there to Pontypool Road.

L.M.S.R. LOCOMOTIVES.

New Crewe-built 2-6-0 mixed traffic engines Nos. 13150-5 are now in service and working temporarily from the South shed. It is understood that the first ten engines of this series—up to No. 13159—will be allocated to the Western Division (L. & N.W. section). In addition to the 75 engines of that type which are to be built at Crewe, an order for twenty similar engines was recently placed at Horwich. These, when completed, will bring the total of the type up to 225. The new Horwich series will bear the Nos. 13130-49.

In connection with the approaching completion of Crewe's 6,000th locomotive (this will be a 2-6-0 engine, No. 13178), it is interesting to note that the first engine, a 2-2-2 type single-wheeler of Allan's design, was put to work in February, 1845, and although withdrawn in 1902 it is still preserved at the Crewe works. It may also be of interest to note that the 1,000th locomotive was turned out in 1866; the 2,000th in 1876; the 3,000th in 1887; the 4,000th in 1900 (this was shown at the Paris Exhibition of that year); and the 5,000th in 1911.

Recent conversions to Class "G1" (superheater) comprise Class "G" Nos. 9095, 9106, 9141 (old Nos. 1582, 1647, 1794) and Class "D" Nos. 9049, 9052 (old Nos. 2530, 2552). In each case ordinary flush-top boilers have been provided, as before, but the engines are now fitted with the vacuum brake with increased power, in lieu of the former steam brake.

"Claughton" class engine No. 5917 *Charles J. Cropper* (old No. 1567), previously altered for the Northern Division gauge, is now restored to its original form, except that the cab has been altered to suit the Midland gauge. On the other hand, No. 5942 (old No. 2366), of the same type, is now running with boiler mountings cut down for the Northern Division gauge. The rebuilt "Claughtons" of Class 5x were all adapted to the latter at the time when they were converted from standard.

4 ft. 3 in. 0-6-0 Coal Class No. 8108 (old No. 3563) has ben sold to the Shropshire & Montgomeryshire Light Railway. Recent withdrawals include 4-4-0 "Renown" class No. 5143 *Revenge* (old No. 1959) and small-boilered 0-8-0 "C1" class Nos. 8974 and 8980.

L.M.S. New Locomotives for 1929.

Type.	Where built.	Numbers.	Total.	
4-4-0	Derby	575, 576, 580, 613–628	19	
2-6-4T	,,	2325–2376	50	
0-8-0	Crewe	9500–9599	100	
0-6-0T Dock	Derby	11277–11279	3	
2-6-0	Crewe	13108–13109	2	22
,,	Horwich	13110–13129	20	
	Total in Co.'s Shops ..		194	
0-6-0T	Hunslet	16670–16670	5	
,,	Beardmore	16724–16749	26	
	Total "outside" ..		31	
	Grand Total ..		225	

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THE WHY AND THE WHEREFORE.

RAILWAY MAGAZINE *readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to the dimensions and weights of railway rolling-stock and to names, numbers, dates, &c., of locomotives should not be forwarded. No reader should send more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history or "grouping," the pages of the "Railway Year Book" (5s. net) should be consulted. The thirty-second Annual Edition* (1929) *of this standard railway reference work is now published. All previous Editions are out of print.*

Uxbridge Stations (G.W.R.).

Mr. R. D. James writes: "The old station in Vine Street on the West Drayton branch remains practically unaltered for 50 years, as I knew it well in school-days in the late 'eighties. It belongs to the 'goods shed' type of passenger station. One service that is defunct is the service to Victoria, S.E. & C., *via* West London Junction and Latchmere Junction (Battersea). When the G.W.R. & G.C. Joint Line was constructed a branch was given to Uxbridge (High Street), with a bridge across the Oxford road at the foot of Uxbridge main street. This had the appearance of a possible intention to run a 'roundabout' service to and from Paddington, outward by the main line and returning by the G.W. & G.C. Joint Line, but nothing happened, and after the bridge remaining derelict for years it was removed, giving High Street Station a rather curious appearance from the street. Unlike the West Drayton branch, the Denham branch has always been a more or less local affair, with a shuttle service of auto-trains. The Metropolitan, though planned many years ago, took a very long time to eventually reach Uxbridge."

[Further reply to "NORTHERNER."]

2-6-0 Engines on Furness Route, London Midland & Scottish Railway.

Several readers have written in reference to the reply given in the January issue as to the non-use of the standard mixed-traffic 2-6-0 locomotives of the London Midland and Scottish Railway over the Furness section. It appears that the ban is no longer operative, and that engines of this type are allowed to work between Carnforth, Barrow, Whitehaven, Maryport and Carlisle; also between Dalton Junction and Park South (the loop avoiding Barrow) and from Arnside to Hincaster Junction. Over other Furness lines and branches they are not allowed to travel. Correspondents have instanced one or two cases of 2-6-0 engines working special trains over Furness metals, but their appearance here is still one of comparative rarity. The 2-6-4 tanks, on the other hand, are extensively employed on the Furness section.

[Further reply to FRED DIXON.]

Locomotive and Rolling-Stock Colours.

Locomotives of the Great Northern, North Eastern and London and South Western Railways were painted practically in the same shade of green as is now employed by the London and North Eastern and Southern Railways. Midland coaches were painted in what is now the London Midland and Scottish Railway standard, but the North Eastern and South Eastern and Chatham employed a fairly deep shade of crimson lake, while the Glasgow and South Western and North British Railways used a kind of red-brown colour.

[Reply to N. D. H.]

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Through Trains from the North to the Southern Railway.

Mr. T. H. Donohue writes:—"As I resided at Portsmouth for many years pre-war, I can settle the queries raised by two or three correspondents as to the route which a special from Norwich to Portsmouth would follow. Such a train would go *via* Peterborough on to the old Great Eastern, thence to New Cross, and *via* the old Mid-Sussex route to Portsmouth. This route was, and still is, invariably used when naval ratings from Shotley Barracks, Ipswich, go to the Royal Naval Barracks Station, in Unicorn Road, at Portsmouth. The last train of the sort I saw was hauled by one of the B 75 class 4-4-2 express tank engines, probably from New Cross Shed, as none of this class have ever been at Fratton, and was waiting on the High Level at Portsmouth Town to go down the spur line which leads to the northern end of the Dockyard and on which the Naval Barracks Station is situated alongside Unicorn Road, and, incidentally, right under the Barracks billiard room! Another reason for the pre-grouping use of this route was that both the old Great Eastern and Brighton systems used the Westinghouse brake, and unnecessary complications arising on any other route were avoided. This, I believe, is no longer the deciding factor it used to be; but the route itself is much the simplest."

[Further reply to "ROUNDABOUT."]

Outside Bogie Axleboxes, Great Western Railway.

The leading axle of the 4-wheeled bogie used on the Great Western Railway 4-cylinder, 4-6-0 engines of the "King" class has axleboxes arranged outside the wheels, the second axle having its bearings between the wheels. This method has been adopted as the inside cylinders come approximately above the leading-bogie axle, and no room is available for inside bearings. In the case of the second axle the bearings are arranged between the wheels, as the outside position would not provide the necessary clearance behind the outside cylinders when rounding curves.

[Reply to G. JEFFERSON.]

The Franco-Spanish Frontier.

On all trains between France and Spain there is transhipment at the frontier owing to the break of gauge, the Spanish gauge being 5 ft. 6 in. and the French 4 ft. 8½ in. The new route to Barcelona *via* Puigcerda and Ripoll is not electrified, but it is noteworthy that on this route there will, in due course, be through working between France and Spain as the result of the laying in of a third rail on the Spanish lines between Barcelona and Ripoll. The line thence to Puigcerda is laid on the 4 ft. 8½ in. gauge under a Decree of the Spanish Government passed in 1928.

[Reply to W. A. SHEPHERD.]

Great Chesterford-Newmarket Railway.

The disused line you have noted, starting from Great Chesterford Station, is the commencement of an early line intended to proceed direct to Newmarket. We cannot recall how much of it was actually built, but it dates from the days of the Northern and Eastern Railway.

[Reply to BM/NSOF.]

Continental Railway Gauge.

The standard gauge of the Continent (except in Spain, Portugal and Russia) is 1.45 metres, or 4 ft. 9 in., which is ½ in. more than the British standard gauge of 4 ft. 8½ in.

[Reply to J. M. INNES.]

"River" Class 2-6-4 Tank Locomotives, Southern Railway.

The whole of the engines of this class have now been converted to tender locomotives of the 2-6-0 wheel arrangement.

[Reply to J. A. PRESS.]

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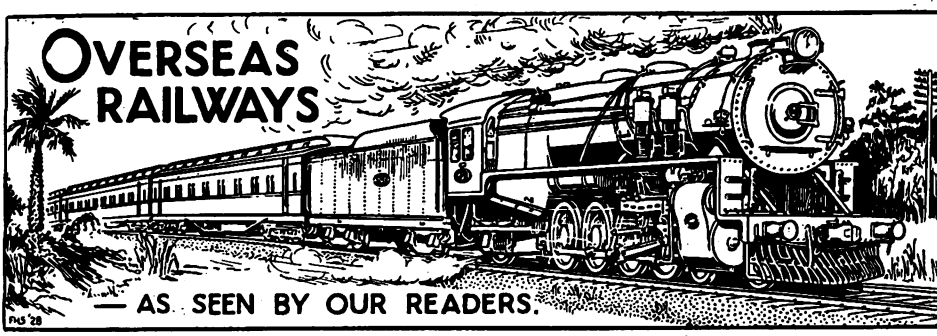

Correspondence for this section, with or without photographs, is invited.

Notes on Dutch Railways.

A VERY fine system of electric trains works between Rotterdam and Amsterdam, *via* The Hague, Leiden and Haarlem. These are of multiple-unit, run in 3, 6, 7 and 8-coach trains by the a.c. overhead conductor. The trains comprise, 1st, 2nd and 3rd class, and run frequently, about every quarter of an hour or twenty minutes. Many of the engines are 4-6-0's, built by Beyer, Peacock & Company, of Manchester, and have large, roomy cabs. Other types of locomotives exist, also built by this firm. The engines are painted light green, and the electric trains referred to are cream coloured. On the principal expresses "Mitropa" sleeping and dining cars are attached. These cars are red.—[W. A. SHEPHERD.]

Steel Sleepers in Germany.

MR. B. WALMSLEY, Chairman of the Steel Sleeper Committee of the National Federation of Iron and Steel Manufacturers, writes:—"I observe that in the section on Overseas Railways in the February issue of RAILWAY MAGAZINE it is stated that 'the Swiss railways are relaying with steel sleepers on all the main lines, in contrast to the Germans who, after a trial, are removing theirs.' While this statement is true as regards the Swiss railways, where 6 per cent. of the lines are laid with steel sleepers, and this proportion is to be increased; as regards the German railways it is quite misleading, if not entirely inaccurate. In certain parts of the Ruhr valley corrosion of steel sleepers has been experienced owing to acid fumes from chemical works, and although this is confined to small localities, the railway authorities have for the present decreed that timber sleepers only are to be used in the Ruhr district. The use of steel sleepers on the greater part of the German railway system is steadily increasing, amounting to 5 per cent. of the whole in 1929, as against 1 per cent. in 1928, and the authorities have decided to use a still higher proportion, having found that

(*a*) they form a better tie and maintain the gauge more accurately;
(*b*) they can be more quickly laid;
(*c*) the cost of the track is certainly not higher than timber, and there is every prospect of the labour costs on the track being reduced.

Owing to the wide-spread misconceptions on this subject I trust you will find space for this statement of the facts in the next issue of your magazine."

American Locomotives in France.

I SHOULD like to add the following remarks *re* American locomotives in France to those of Mr. G. T. Moody in the November number and Mr. J. Birch in the February number. Taking them in order, Mr. Moody has some figures right and others wrong. There were many more than 150 Baldwin 2-8-0 type, but he is correct as to the 40 Canadians. These were all taken over by the C. de f. du Nord and converted to 2-8-2 tanks by Fives-Lille and the Cie. Franco-Belge in 1922. In this condition they may still be seen on heavy shunting duties at La Delivrance, Aulnoye, Tergnier, Lens, Longueau and Hirson. They are Nord 4.1664-4.1700. As far as I can find out, the other three were never converted, even if the Nord ever took the 40 of them. The American 2-8-0 engines were of three classes, two being built by Baldwins (superheated and non-superheated), and the other by the American Locomotive Works. The Baldwin engines (both types) are to be found on all the French lines, except the Alsace-Lorraine, in fairly large numbers, and I can supply details in most cases, if any readers are sufficiently interested. The American Locomotive Works engines have gone, I believe, to the Midi and P.O. lines. I know that the latter have 76 of them (I have full details of these), and that they are to be found principally at St. Pierre-des-Corps, Nantes, Limoges, St. Nazaire, etc. Some may also have gone to the Etat, but

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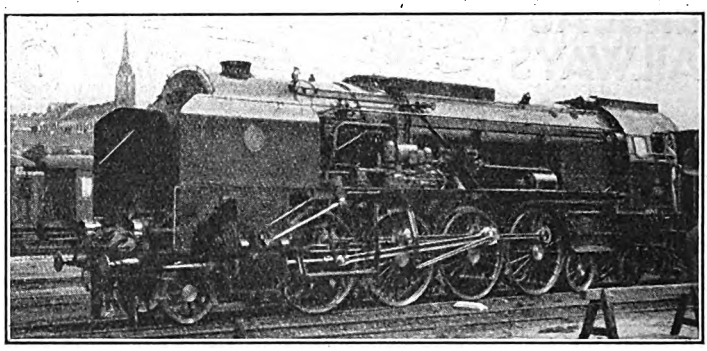
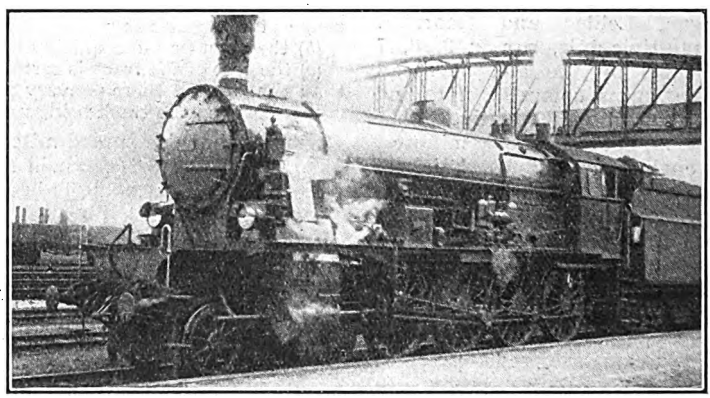
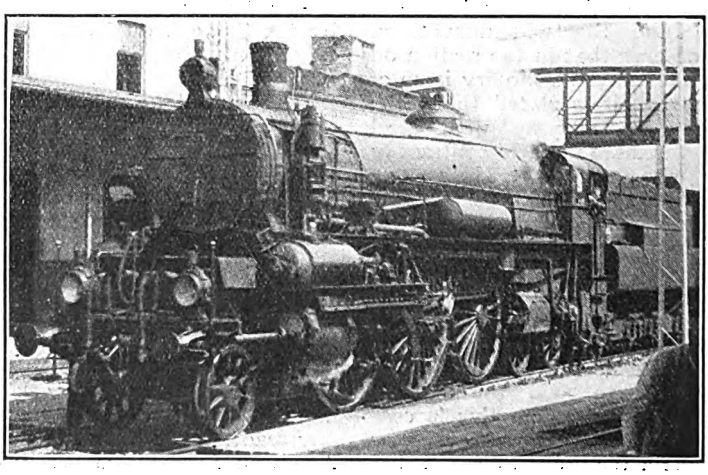


THREE-CYLINDER 2-8-4 No. 114·101.



4-8-0 No. 113·34 AT SALZBURG.



2-6-4 No. 310·90 AT SALZBURG.

NOTABLE AUSTRIAN LOCOMOTIVES.

(Photos. by F. L. Angerer.)

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of this I am not sure. The tank engines built for France do not provide much information. The 2-6-2, as far as I know, all went to the Belgian State, as did 30 tanks of the 0-4-0 type. The rest were probably disposed of to various firms. Couthon, near Paris, had Baldwin No. 43111 not long ago, and this firm may have had others. In conclusion, I should like to hear from any readers who are interested in French railways and rolling-stock.—[C. H. DICKSON.]

IN the same connection, Mr. R. V. Happe sends some remarks based upon observations during his travels on various French lines as follows: "The 2-8-0 Baldwin tender locomotives (U.S.A. or R.O.D. type) are in service on all the French systems except the Paris-Orleans Railway. The American locomotives—also of 2-8-0 tender type—built in 1917 by the American Locomotive Company at Schenectady Works, are running only on the C. de fer de l'Etat, and are numbered 140-500, 501, etc. The 2-8-0 tanks are, as stated by Mr. Birch, all on the C. de fer du Nord for marshalling work, chiefly for yard service near Amiens. I have never seen on French systems either American saddle-tank or petrol engines. Pacifics, American engines (two cylinders), built shortly after the war, are running on the Paris-Orleans Railway (Nos. 3600, etc.), chiefly between Tours and Bordeaux. The English tank engines of the W.D. (4-6-4) type are hauling suburban trains in the Paris district of the C. de fer du Nord. They were built in 1914 by Beyer, Peacock & Company, of Gorton Foundry, Manchester, and are numbered 3850, etc. I have not seen other British locomotives on French railways."

Notes on Central European Railways.

REFERRING to the "Notes on Central European Railways" by Mr. P. N. O. Porter in the November issue, I should like to correct a mistake which occurred in the description of a photo on page 388. The engine shown is not Austrian but a Polish 4-8-0 express-loco. of the OS24 class, which are a copy of the Austrian engines, but differ in a few details. Most of the Polish engines are equipped with piston-valves, while the Austrian 113's are fitted with Lentz poppet valves throughout. The other less important differences between the above-mentioned locos. are in the smoke-box-door, the sand box and the cab.

The Austrian Federal Railways (Oesterreichische Bundesbahnen; shortened: B.B.Oe.) comprise all railways in the country with negligible exceptions. Owing to the mountainous character of the country traversed, level stretches of line are very rare, and sharp curves are inevitable, so that real fast running can be expected nowhere. The speed-limit stipulated by law is 100 kilometres per hour (62 m.p.h.)—exceptionally the new 2-8-4 engines are allowed 110 km.p.h.—but on many lines it is restricted to 90 or 80 km.p.h. or even less on account of frequent curves of 1,200 or 1,000 (on the mountain-lines even 800) ft. radius. The Semmering Railway was opened in 1854. It climbs up to the Semmering Pass (2,960 ft. above sea-level) at a ruling gradient of 1 in 40, the curves being 620 ft. in radius. This line is double-track throughout, and connects Vienna with the southern parts of Austria and with Italy and Jugoslavia.

The Brenner Railway connects Innsbruck with Italy, and climbs to an altitude of 4,550 feet above sea-level, Brenner Station being thus the highest main-line station in Europe. From Innsbruck to the west, communication with Switzerland is established by the Arlberg Railway. The Arlberg Tunnel, between St. Anton and Langen, is 6.35 miles in length and 4,300 feet above sea-level. The gradient on the western slope amounts to 1 in 29.5 for some length. The Brenner and Arlberg lines and their continuations to Salzburg are now operated electrically by the 15,000-volt single-phase A.C. system, as in Germany and Switzerland.

The last of the great mountain railways is the Tauern Railway. It connects Salzburg with the south, passing Bad-Gastein. The summit tunnel on this line is 5.25 miles in length and 4,030 feet above sea-level. The ruling gradient on both slopes is 1 in 35. Like the Arlberg line, this line is single track, except the summit tunnel, which in both cases is double track. On the other principal lines the maximum gradients are 1 in 50 or 1 in 70. The only exceptions are the lines from Vienna to Salzburg and Passau, where the grade is only 1 in 90 to 1 in 100, and a few lines from Vienna to the north and east, which are easy graded. In the season, train-loads often reach 500 to 550 tons. This needs rather powerful locomotives; nevertheless, piloting or banking assistance is inevitable on the severe grades.

Now a few general remarks concerning locomotives. The colour generally appears black, because, with few exceptions, the engines are not kept very clean. Exactly stated, new-built locomotives are painted black, with green lining (electric locomotives, green with red lining). When they are repainted in the shops, they are painted black all over (electric locomotives, green all over; wheels and frame black); sometimes the wheels are painted in a brownish

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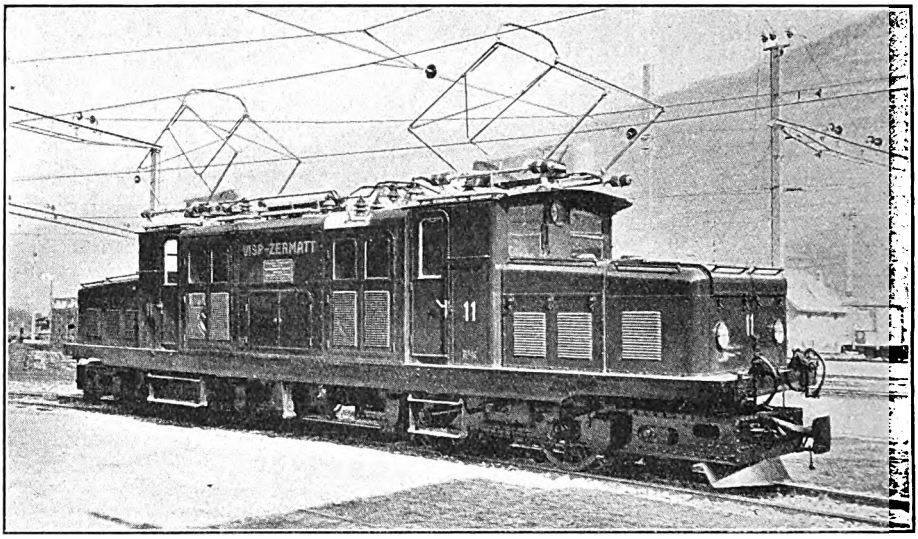

Photo.] **VISP-ZERMATT ELECTRIC LOCOMOTIVE.** [*P. Chatelanat.*

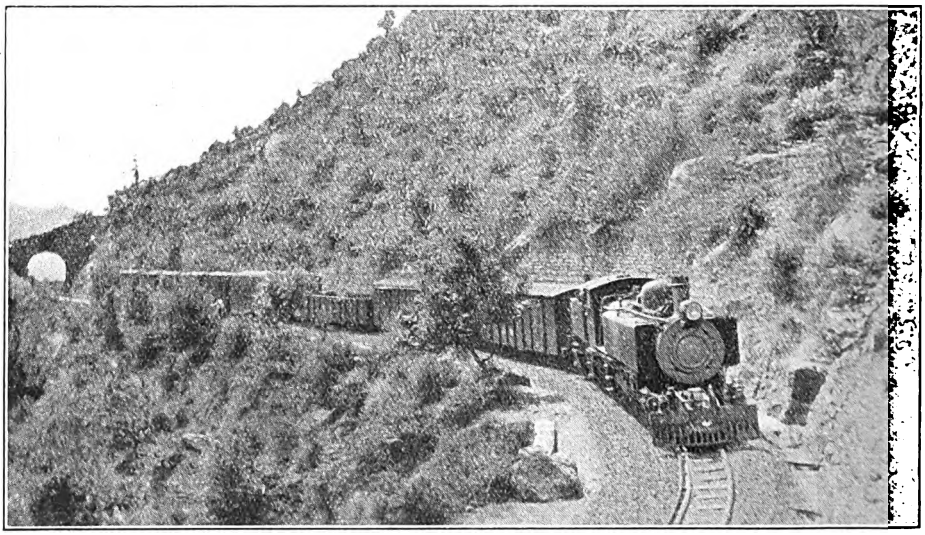

Photo.] [*P. S. A. Berridge.*

KALKA-SIMLA RAILWAY GOODS TRAIN NEAR KHANDA GHAT.
Kitson-Meyer 2-6-2 + 2-6-2 locomotive.

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red. Recently many locomotives have "neck-ties" of brass or red paint round the chimney; that means that they are fitted with the "Langer fuel-saving apparatus." All new-built engines are superheated, and steam is distributed by Lentz poppet valves. Feed water heaters are common—either of the "Dabeg" system or exhaust steam injectors. Unlike most of the other Continental railways, Austria had formerly introduced the vacuum automatic brake, but it is now gradually changing to the Westinghouse system, so that many engines are at present fitted with both brakes. Austrian locomotives are not named, but numbered according to classes. The first number always means the class. For example, 114.01—114 being the class and 01 the "individual." Similar types of engines differ only in the "hundreds" of the class number, as, for instance, 114 class and 214 class; both are 2-8-4, but the first is a three-cylinder and the other a two-cylinder engine.

The crack train of Austria is the Arlberg Express, travelling between Vienna and Paris via Salzburg, Innsbruck, Zurich, and Basle. On its way from Vienna to Buchs, on the Swiss frontier, it has to traverse three principal watersheds lying 1,974, 3,167 and 4,306 feet respectively above sea-level. This train (it is composed of blue "Wagon-Lit" stock) covers the 745 kilometres (463 miles) from Vienna to Buchs in 12 hrs. 40 min. (in the reverse direction 12 hrs. 25 min.), including nine stops, which is rather a good time, having regard to the steep gradients and frequent sharp curves, especially between Salzburg and Feldkirch.

Finally, a few remarks on signalling. Some signals are of the upper-quadrant type. Distant signals are rectangular discs painted green and white; shunting signals are square discs standing on the corner and painted blue and white. Colour-light signals are in use, too. Colours differ from the usual practice in so far as white means "clear," green means "caution," and blue "no shunting." Where several tracks run alongside, main-line signals are usually fitted with flash-lights.—[F. ANGERER.]

The Visp-Zermatt Railway.

IN view of the controversy between correspondents in regard to the electrification of this line, the following notes, based upon first-hand information and sent by Mr. P. Chatelanat, will be of interest, in conjunction with the photograph reproduced. The first electric engine, it appears, started working during the beginning of August, and the official opening of the new system took place on August 22. However, steam traction had to be retained partly until the end of October, when there was a sufficient number of electric locomotives delivered to enable to dispense entirely with the faithful old steam locomotives, which are being kept in reserve for special duties. Needless to say, the change has proved most beneficial to travellers. Voluminous coal particles will no more obstruct the view of the Matterhorn and mar the pleasure of those standing on the outside platforms. Enclosed please find a reproduction of the new engines, which do very fine work on the steep rack and pinion sections and numerous flat stretches as well."

City Railways in Germany.

UNDERGROUND or elevated "city" railways are to be found in four German-speaking cities, Berlin, Hamburg, Wien (Vienna) and Wuppertal. Both Berlin and Hamburg have two systems, one owned by the Reichsbahn and the other by the City. The Berlin Stadt-Ring-und-Vorortbahn (City, Circular and Suburban Railway) of the Reichsbahn is a four-track elevated system crossing the City from east to west, two tracks being used for ordinary trains and the other two for local services. The Ringbahn is also four-track, but two lines are used only by freight trains in view of the important inter-connections with the main routes which the line provides. The Vorortbahn consists of a system of suburban routes in various directions. Most of the trains utilise also portions of the City or Circular Railway. The State-owned underground and elevated system of railways has always been operated electrically, and includes, beside the older sections, several extensions built since the war, while others are projected.

In Hamburg the railway system is somewhat similar to that in Berlin. There is an electric section belonging to the Reichsbahn, leading to the Hamburg and Altona Central stations; also a system of underground and elevated lines, the latter consisting of a circular route with one central section and three branch routes.

In Vienna the underground and elevated local lines were, at one time, operated by steam traction, but are now worked electrically. There is a main circular route, with two branches. On certain services short trains of three cars run partly on the elevated line and then transfer to the ordinary tramway tracks. Steam trains are still used on some of the outer routes. The electric lines are operated by the city of Vienna.

Wuppertal (Valley of the Wupper River) is a city of 415,000 inhabitants, constituted

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in 1929 by associating the cities of Elberfeld, Barmen and Vohwinkel, a little south of the well-known industrial district of the Ruhr. Wuppertal is situated in the narrow valley of the Wupper, and local transport has always been the problem. The well-known Barmen-Elberfeld suspended railway was built in 1903, and mostly follows the river. It is still working quite satisfactorily. The line is about eight miles long, with loops at each end. It is an interesting experience to travel above the river, the train swinging round the many curves as it follows the course of the river and crosses its many bridges.

Before the war, a city railway was planned for Leipzig, and an underground station was built below the new central station. So far, however, owing to lack of funds and other causes, the scheme has not progressed further. It is anticipated that seven other German cities, having more than 500,000 inhabitants—Köln, Essen, München, Leipzig, Dresden, Frankfurt-am-Main and Breslau—will eventually have to provide underground and elevated lines to meet local requirements. I may also mention the projected "Rheno-Westphalian High Speed Railway," which is designed to cross the industrial area from Köln, via Düsseldorf, Duisburg and Essen, to Dortmund.—[FRIEDRICH GRÜNWALD.]

Further Notes on French Railways.

ABOUT six months ago I was staying for a time at Marennes, a small town about twelve miles south of Rochefort, on the seacoast of France opposite the island of Oléron ; and I was enabled to make various observations of the railways in the South-West of France. The branch line from Rochefort to Marennes and Le Chapus (for the island) leaves the main line from Rochefort to Bordeaux about six miles south of the former town. From this point to Le Chapus the line is single track ; and there are only three passenger trains daily in each direction from Rochefort to Le Chapus. The line, which passes through entirely flat country, is worked chiefly by Etat 4-6-0T locomotives, with outside cylinders. These handle both passenger and goods traffic, but one inside-cylinder 0-6-0T, No. 30,115, of a type common on the Etat system, often deals with some of the passenger trains. The rolling-stock in use on the branch is very varied ; most of the third-class vehicles are of "tramway-type," with open platforms at either end. Some of these vehicles have four and some six wheels. Marennes is also served by a line of the "Voies Ferrées d'Intérêt Local d'Aunis et Saintonge." This tramway, on the metre gauge, runs from Marennes to Saujon, while another line runs to Saintes. (There are also other lines which do not serve Marennes, one being on the island of Oléron). From Marennes to Saintes, on the Rochefort-Bordeaux main line, there are two "trains" each way per diem. The journey of about 25 miles occupies just over two and a-half hours, and the line runs partly by the roadside and partly across-country. The "trains" are usually composed of one or two small passenger vehicles, with open platforms, and one or two goods vehicles, drawn by small outside-cylinder tank locomotives, which are painted dark green. The Marennes to Saujon line, however, on which there are two trains a day, is usually operated by an eight-wheeled petrol-driven vehicle. This, like other passenger cars on the tramway, is finished in varnished teak.

During my stay in France I visited Bordeaux, and travelled from there to Bayonne and back by the electrified main line of the Midi. A few 4-6-4 electric locomotives were seen, but 0-4-4-0's were for the most part in evidence. Although the Bordeaux-Dax-Bayonne section is electrified throughout, quite a number of steam locomotives were seen *en route*. They were chiefly of the the old Midi outside-cylinder 0-6-0 type, but two very ancient looking 2-4-0's, with fairly small wheels and huge spark-arrester chimneys, were also noted. At various stations on this line as it passes through the Landes, connection is made with branches running coastwards—for example, from Labouheyre to Mimizan-Plage. These branches are owned by the "Société anonyme des Voies ferrées des Landes," and are of standard gauge, but of somewhat light construction. Two or three small outside-cylinder side-tanks were seen at Labouheyre and elsewhere. These engines are spoilt in appearance by their spark-arrester chimneys, which are doubtless a necessity, since the lines run for the most part through forests. They are painted black.

Though the Paris-Orléans main line from Les Aubrais-Orléans to Bordeaux is steam-operated, a P.O. 0-4-4-0 electric locomotive was seen in Bordeaux St. Jean station, and, later, as far south as Bayonne. Two Midi American-type 2-8-0's were also seen at Bordeaux. Around Rochefort, on the Etat Bordeaux-Nantes main line, this latter class is very numerous on goods trains. On branches in the same area, though not on the previously-mentioned Marennes branch, may be seen a few outside-cylinder Etat 2-4-0 engines. Like many old French locomotives, they have outside eccentrics.

[NORMAN FORBES.]

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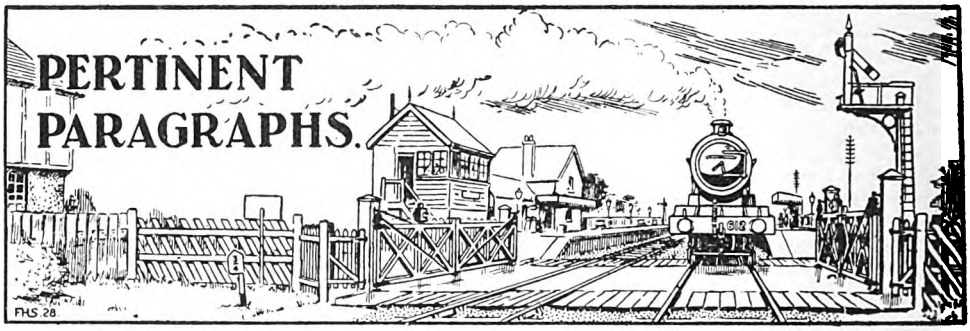

G.W.R. Meeting.

VISCOUNT CHURCHILL, in his address to the proprietors of the Great Western Railway Company at the annual general meeting, dealt very exhaustively with the results of the year's working. It was a highly satisfactory state of affairs which he had to unfold, and the numerous new developments during the past year made a most interesting story. Among the points brought out by the Chairman was that, although the total debit balance on capital account was as much as £6,855,907, and further heavy capital expenditure was in view, the directors were not contemplating the raising of any further capital as the company's liquid resources were ample to finance the overdraft and immediate new works. He also mentioned that an additional amount of £467,835 ranked for ordinary dividend for the first time in 1929, this amount representing the deferred certificates issued in exchange for some of the stocks of the Brecon & Merthyr, Cambrian and Midland & South Western Junction Railways on absorption. Completion of the programme for fully equipping the South Wales docks with appliances capable of dealing with 20-ton wagons is one of the most important features of the proposals submitted to the Government by the company under the Development Act. Lord Churchill expressed the hope that, given a continuance of present conditions, the reduction in net revenue which would result from the cessation in May next of the 2½ per cent. "cut" in salaries and wages would be offset by improvements in other directions. The proprietors expressed their entire satisfaction with the substantial operating economies achieved by the officers with the co-operation of the staff, in the unanimous vote of thanks which concluded the proceedings.

Southern Railway Meeting.

ELECTRIFICATION in the present and in the future was given considerable prominence in the address of the Chairman to the proprietors of the Southern Railway Company at the annual general meeting. Suburban electrification, he remarked, had again come to the company's assistance in regard to passenger train receipts; in fact, the increase in traffic in the electrified area was progressing at a pace which had considerably exceeded all expectations. With regard to the decision to proceed with the electrification of the line from London to Brighton and Worthing, the Chairman said the directors had, after careful consideration, come to the conclusion that for the working of the new trains the multiple-unit system would be more advantageous than electric locomotives. It was proposed to run non-stop trains every hour during the day between London and Brighton, another service every hour between London and Worthing, calling at three or four intermediate stations, and also a service of semi-fast trains from London to Brighton and Worthing. There would also be a service of stopping trains between the same points. For the present steam train mileage of about 1,972,000 miles per annum it was proposed to substitute an electric train service with a mileage of about 4,921,000, when the new electrification scheme was completed, as it was expected to be, in 1932.

Metropolitan Railway Meeting.

LORD ABERCONWAY had an encouraging account of progress to tell at the annual meeting of the Metropolitan Railway Company, when the shareholders unanimously approved the adoption of the report and accounts and the promotion of the Bill proposing an extension of the railway from Wembley Park to Little Stanmore. He drew attention to the very substantial increase in 1929 of nearly £22,000 in the receipts from season tickets. This was satisfactory, as it represented a permanent addition to the company's clientele and proved the wisdom of its policy in facilitating the development of building estates in the outer suburbs served by the railway and in catering for such longer distance business. The policy of improving

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stations and thereby increasing rentals as well as traffic facilities is being successfully continued, and there is already a waiting list for the flats in Chiltern Court. Calling attention to the very favourable operating ratio of 65.05 per cent., the Chairman said this was the crucial test of railway management, and he congratulated Mr. Selbie on such a result. The apparent discrepancy between the published figures, which indicated an increase of £36,000 in traffic receipts and the actual increase of £17,746, is explained by important adjustments in regard to through traffic with other companies which had to be settled towards the end of the year. A very satisfactory response was made to the recent offer of £2,000,000 new debenture stock.

L.M.S.R. Meeting.

In his address to the proprietors at the annual general meeting of the London Midland & Scottish Railway Company, Sir Josiah Stamp dealt with the remarkable economies which enabled the decrease of £674,808 in railway gross receipts for the year 1929 to be converted into an increase of £103,667 in railway net receipts. He gratefully acknowledged the spirit of co-operation in all grades which had enabled this satisfactory result to be achieved, and pointed out that the saving of £610,000 in purely operating expenses had followed one of £2,500,000 in the previous year, and further economies were likely to continue side by side with greater efficiency and better service to the public. These savings were altogether independent of the agreed 2½ per cent. cut in fees, salaries and wages, and he justified the payment of the increased dividend for 1929, in face of the fact that this particular saving would operate during only 4½ months of the current year, by explaining that one of the reasons for the 2½ per cent. "cut" being agreed was in order to help dividends. Scientific research had already done much in the achievement of efficiency and economy, and further developments in this field were promised. Unemployment in the north-western area, from which the company drew so much valuable traffic, was much more severe than in other parts of the country and largely accounted for the decreases in passenger and high-class merchandise traffics, though road transport was, of course, also a factor. Owing to the success of containers and of Garratt locomotives, their use is being substantially extended. He included in his speech an appreciation of the late Mr. R. W. Reid, and gave a useful summary of the arrangements which are being made in connection with road transport.

The L.N.E.R. Meeting.

Mr. Whitelaw was fortunately able to explain the accounts for 1929 under much more favourable conditions than has been the case for the last year or two, owing to the more satisfactory financial position reached at the end of 1929. He brought out several interesting facts in the course of his speech. Thus, capital expenditure during the year had benefited by credits covering £74,000 because of reduction of stock by 46 engines, and £436,000 from reduction of wagon stock by £5,031. The one is, of course, due to the introduction of more modern locomotives, and the other to the increase in wagons of 12 and 20 tons capacity. Workshop improvements, decrease in numbers of engines held up for repairs, and developments in regard to steamships, docks, shipping appliances, &c., were touched upon, as also the progress made in respect of road transport. He pointed out that, although during the year 13,500,000 more passengers were carried, exclusive of season ticket holders, the average fare was less by nearly 1½d., so that receipts were less by £424,000. Whether a better financial result would have been obtained if the fares had not been reduced by quite so much was, however, a question as to which no positive answer could be given. There was also a decrease from season tickets, but an increase in parcels and mails. Third-class sleeping car facilities had proved popular, though there was a slight decrease of first-class sleeping car traffic due to transfer to third-class. To carry the increase of 13,500,000 passengers it had been necessary to run 2,065,000 more loaded passenger train miles. Of this, 1,166,000 was accounted for by the steam rail cars, the number of which had been increased by 31. There had been great increases in coal traffic, as also in certain other classes. Various new works were mentioned, and suburban electrification and the proposed tube line from Liverpool Street to Ilford were touched upon. Next year a shortened form of accounts will be issued to stockholders, as has already been done by the London Midland & Scottish and Southern Companies. There was also a very satisfactory increase in traffic connected with the sugar beet industry. Negotiations are proceeding with the Government in respect of works which will involve an expenditure of about £7,000,000 under the passenger duty and development schemes.

U.S.A. Railroad Information.

The "Committee on Public Relations of the Eastern Railroads" has issued from 143, Liberty Street, New York, a "Year-

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book of Railroad Information" for 1929, which includes many useful items in regard to the progress of U.S.A. railways. For the most part, these are set forth diagrammatically, in some cases with colour, but for the present we extract only the following, showing 1928 totals and percentage increase (+) or decrease (−) since 1911.

		Per cent.
Route mileage	260,000	—
Track mileage	426,000	+ 17
Passenger train vehicles	53,097	+ 13
Number of locomotives	59,391	+ 2
Average power of locomotives..		+ 55
Number of freight cars ..	2,297,677	+ 9
Freight car capacity ..		+ 35
Revenue freight tonnage	2,361,622,636	+ 45
Revenue freight ton mileage	432,915,184,526	+ 73
Number of passengers ..	790;327,447	— 16
Passenger mileage ..	31,601,341,798	— 2
Passenger revenue, day coaches	$464,253,457	— 42
Passenger revenue, sleeping and parlour coaches ..	$436,073,396	+ 22
Average revenue per ton-mile	1·081 cents	+ 45
Average revenue per passenger mile	2·850 cents	+ 45
Net earnings	$1,172,864,100	+ 62
Operating revenue ..	$6,111,735,511	+ 122
Operating expenses ..	$4,427,995,036	+ 133
Number of staff	1,656,686	+ 4
Total wages	$2,827,590,471	+ 142
Average annual wage ..	$1,706·78	+ 134
Average miles per freight car	31·3	+ 25
Average freight train tonnage	793	+ 12
Average number of cars in freight train	48	+ 30
Average freight train speed	12·9	+ 25

Metropolitan Railway Steam Locomotives.

MR. A. CRAWSHAW sends the following notes:—

Class "A"; 4-4-0T; Nos. 23, 27, 41, 48 and 49.

Class "B"; 0-6-0ST; Nos. 101 and 102.

Class "E"; 0-4-4T; Nos. 1, 77, 78, 79, 80, 81 and 82.

Class "F"; 0-6-2T; Nos. 90, 91, 92 and 93.

Class "G"; 0-6-4T; Nos. 94 *Lord Aberconway*, 95 *Charles Jones*, 96 *Robert H. Selbie*, 97 *Brill*.

Class "H"; 4-4-4T; Nos. 103, 104, 105, 106, 107, 108, 109, 110.

Class "K"; 2-6-4T; Nos. 111, 112, 113, 114, 115 and 116.

On the loco. returns there is shown one departmental locomotive.

Roundabout Trains.

WHILE this term will cover any train which follows an involved and circuitous route, it is generally used to apply to trains which return to their starting station or finish up somewhere near, without any intermediate reversal and on the basis of a continuous schedule. Actual "Circle" trains, such as the "Inner Circle" in London, answer this description, but it is generally applied to services which start from and terminate at terminal stations. Among them are the Waterloo-Waterloo and London Bridge-London Bridge trains of the Southern Railway, the Cathcart Circle trains of the L.M.S.R. in Glasgow, and the L.N.E.R. electric Newcastle-Tynemouth-Newcastle trains. On a less restricted basis were the old Middle Circle (Aldgate to Mansion House) and Outer Circle (Broad Street to Mansion House) services, with some of the present S.R. miscellaneous services. The Fairlop line trains of the L.N.E.R., in so far as they are now continuous, also come in this category, as also a number of miscellaneous trains to be found here and there, as in the Nottingham area (L.N.E.R.).

Raising a question in this connection, Mr. R. G. Bolton points out that the S.R. London Bridge-Crystal Palace roundabouts run, as it were, inside the London Bridge-Norwood Junction-Selhurst roundabouts. Incidentally, the Waterloo-Kingston-Waterloo roundabouts use separate lines between Clapham Junction and Waterloo, and the same applies to the London Bridge roundabouts in the vicinity of London Bridge. It was proposed to serve the new Wimbledon and Sutton line by trains from Victoria *via* Selhurst to Sutton, thence to Wimbledon and on to Holborn Viaduct, though in practice the trains run between Holborn Viaduct, Wimbledon and Sutton.

Locomotive Driving by Contract.

IT may not be generally known that it was at one time the custom, on a number of railways in this country, for engine drivers to enter into formal agreements with the companies to work trains at a certain sum per mile. The custom seems to have arisen in the earliest days of railways, as, in 1830, the drivers of the Stockton & Darlington Railway were paid ¼d. per ton-mile, out of which they had to find coal and oil, and pay themselves, and probably their firemen as well. The company, however, maintained the engines in general repair. On some parts of the Eastern Counties Railway, trains were worked by contract, and it is on record that a driver

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stationed at Peterborough had his price for working goods trains advanced, in December, 1854, from 5¼d. per mile to 5½d. A few years later, a driver working the passenger traffic between London, Enfield and Hertford was paid 3⅞d. per train-mile. The driver had to sign an agreement in the presence of a witness. He had to pay his fireman and cleaner, provide firewood for lighting up, coal or coke for running, oil, tallow and suchlike necessities. He had also, out of the same money, to repair and pay for the cost of certain repairs, giving all necessary assistance himself on shed days. He had not, however, to provide articles of iron, brass, copper or steel, or pay for labour when the engine went into shops for general repairs or repairs due to accidents beyond his control. For an assisting engine he had to pay 3d. per mile. If required to pilot or assist another engine, he received 2d. for every mile out and home. The drivers bought their fuel and stores from the company.

South African Station Names.

How did the numerous railway stations on the South African Railways system come by their names, asks a writer in the January issue of the *S.A. Railways and Harbours Magazine*. Sometimes, of course, the names are inevitable—Cape Town, Durban and Bloemfontein, for example. It sometimes happens, however, that an original name had to be found for a new station, and one can picture the smile on the face of the man who suggested "Protem" on the Caledon branch in the Cape Province—the fun of it is that it appears to be permanent. And another man must have had a good laugh—he who propounded "Ledzee." The names of many stations or sidings are Biblical. "Eden" occurs in Edenburg (Orange Free State) and Edendale (Natal). Others include Bethlehem, Jordaan, Zarah, Bethany, Manna, Emmaus, Bethesda, Mamre and Goshen. Names familiar in South African history are frequent—Van de Stel, for instance, is a station on the Caledon branch; there are also Krugersdorp, Brandfort, Dewetsdorp, Reitz, Jeppe, Joubert, Harrismith, Lawley, Molteno, Milnerton, &c.; but one looks in vain for a Rhodes station, siding or halt; nor does one find the name of the immediate past Premier (Smuts) or the present Premier (Hertzog). Romance runs through such names as Adelaide, Alice, Darling, Ella, Irene, &c. The number of stations or sidings in the Union ending with "fontein"—there are at least 56—points to the fact that water was one of the first things the voortrekker sought after. That men who came from dales or vales remembered them is indicated by the 30 odd stations or sidings with "dale" or "vale" at the end of the name. English, Welsh and Scottish place-names are numerous; battles of a bygone day have given Alma and Crecy. Agriculture in various forms is suggested, and wild animals of the veld—such as Luipaardsvlei—are in evidence. There are many long names, such as Honeynestkloof and Wolmaransstad; whilst there are four stations of only three letters, viz., Val, Ida, Nuy and Pan, and two sidings or halts named Kys and Mid.

Three Railway Accident Reports.

One of Lt.-Col. E. P. Anderson's reports deals with a side-long collision between a light engine, 4-4-0 No. 9497, and a passenger train, worked by 4-4-2T No. 9452, which occurred at Piershill Junction, Edinburgh, L.N.E.R., on August 7. Responsibility for the accident is placed upon the driver of the light engine, who misread the outer home signals, though he knew them well. He frankly admitted his mistake. As a result of the derailment which followed, a gas pipe alongside the line was broken and the gas was ignited. The signalman is commended for his prompt action in dealing with this.

Lt.-Col. Anderson also reports on the buffer-stop collision at Waverley station, Edinburgh, on July 26, when a steam coach from Penicuik collided, though at low speed, with the buffer stops at the end of No. 5 platform. The coach was No. 31, "Flower of Yarrow." Nine passengers complained of shock or injury. Responsibility is placed upon the driver, in that he did not manipulate his brake correctly. Certain suggestions as to the brake equipment of these coaches are advanced by the inspecting officer.

Col. A. C. Trench reports on the collision which occurred on July 19 at Ardwick Junction, Manchester, L.M.S.R. The passenger train consisted of five coaches, drawn by 4-6-0 No. 5993. The train was run into by 4-6-0 No. 5632. Primary responsibility is placed on the signalman at Longsight No. 4 box, who frankly admitted his mistake, his only explanation being that he was very busy and must have got confused between the down trains which had passed on the fast and slow lines. A degree of responsibility is also placed upon the driver of the light engine. Various suggestions are advanced as to improvements in the signalling at this point.

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"Articles" on L.N.E.R. Handbills.

TAKING their cue from Nature—which, as everyone knows, abhors a vacuum—the London & North Eastern Railway publicity section have hit upon the idea of utilising the backs of handbills for disseminating information dealing with various phases of the company's activities. In a small batch now before us we observe with interest that matter of an instructive kind is published in the form of articles, and we gather that arrangements are being made for all L.N.E.R. handbills, where space is available, to carry articles of this character, the series to be changed from time to time. Thus, on the back of a bill relating to a football function held at Northumberland Park on February 22 we find a short readable article dealing with the distinct personalities of the great London termini; whilst on a second and a third handbill in the same connection are articles, equally readable, on "Week-End Wisdom" and "Footplate Favourites" respectively. On the back of a fourth bill, having reference to forthcoming races at Uttoxeter, there is a charming little essay on the joys of going into the country or, as the case may be, coming up to town "just for the day," which is bound to compel attention. These contributions bear the initials "D. L.," standing for the *nom de plume* Dell Leigh, otherwise Mr. E. P. Leigh-Bennett, who is to be complimented on his effective handling of a useful and bright idea.

The Stoke Ferry Branch, L.N.E.R.

WE are indebted to the Superintendent, Eastern Section, Southern Area, L.N.E.R., for the following information:—A siding was in operation at Keswick Mill, and was removed about 1883. The siding ran into a shed adjoining the River Bridge, partly on railway property and partly off, and was used to tranship coal and stores for the mill. The shed was pulled down shortly before 1920. A banking indicating the layout of the siding is still traceable. In respect to the mineral line from the Stoke Ferry branch, this is the Wissington Light Railway, which connects with the L.N.E.R. at Abbey, on the Downham and Stoke Ferry branch, and extends in the south-west direction to Southery, a distance of 14 miles. It is of standard gauge and worked by private locomotive. Railway goods wagons can pass over it, but no passenger trains or engines are permitted. The line was constructed by Mr. A. J. Keeble in 1905, in order to develop his estate, which, owing to lack of adequate transport facilities, was not cultivated to the extent which would be possible if quick and economical means of conveyance were provided.

The estate was split into several farms, and along the route of the railway a number of loops and short sidings were arranged so that farmers had very little distance to cart their produce. The principal crops consist of potatoes, celery and other roots, and in recent years the cultivation of sugar beet has assumed considerable dimensions. Upon the death of Mr. Keeble, in 1914, the railway passed over to the hands of a Mr. Towler. In 1924 a beet-sugar factory was constructed by the British Sugar Manufacturers, Ltd., 6, Princes Street, London, by whom the Wissington Light Railway was taken over. The management of the railway is entirely in the hands of that company. We place inwards wagons in the exchange sidings at Abbey, and thereafter they are worked by the firm, and likewise outwards wagons are brought to the point of exchange, demurrage being chargeable on stock detained beyond a prescribed period.

Long Railway Mileage in 24 Hours.

A GOOD many years ago THE RAILWAY MAGAZINE conducted a competition as to the longest mileage which could be covered in 24 hours by rail. This aroused considerable interest at the time, and we are reminded thereof by a letter from Mr. E. R. Birkett, of Edinburgh, who writes:—"So far as I can see, the record in this respect is the following schedule, in force in August, 1923; the present timings do not admit of such a lengthy round. It would be interesting to know if it has ever been possible to cover 1,200 miles in one day, entailing an average of over 50 m.p.h. for twenty-four hours, successively: —

From	At	To	Arr.	Distance.
	a.m.		a.m.	Miles.
Berwick ..	12.3	King's Cross	7.5	335.5
King's Cross	7.15	Grantham..	9.23	105.2
Grantham	9.36	King's Cross	11.30	105.2
King's Cross	11.50	York ..	3.20	188.2
	p.m.		p.m.	
York ..	4.0	King's Cross	7.30	188.2
King's Cross	7.38	Wood Green	7.49	5
Wood Green	7.51	King's Cross	8.10	5
King's Cross	8.20	York ..	11.55	188.2
				1120½

An expensive day's outing, unless one had a pass! It is unfortunate that forty minutes at York and fifty at King's Cross account for only ten miles."

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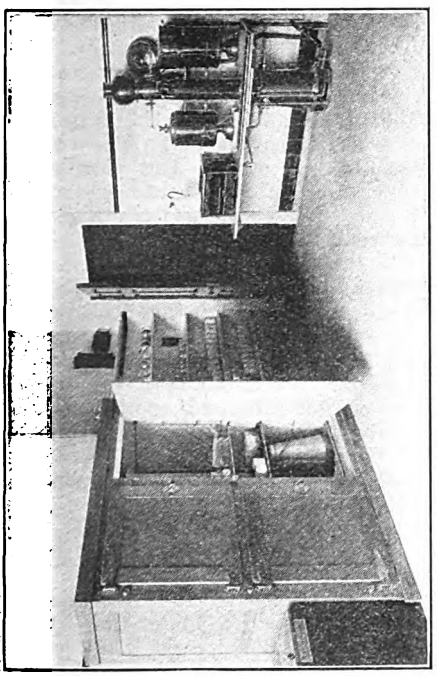
Georgian Tea Room at King's Cross Station.

As part of a scheme for the entire reorganisation of the refreshment and dining-room accommodation at King's Cross station, which will involve, in the aggregate, considerable internal structural alterations, a new "Georgian" tea-room, capable of seating at small tables more than 100 people, was opened to the public recently. It is located on No. 10 platform and is 48 ft. by 41 ft. Smokeless fires are provided with electric radiators. The lighting fittings are of the modern angular reflector type. Furnishings and fittings are of mahogany of Georgian style with blue leather chair seats and blue inset table tops of rubber composition. The flooring, of blue rubber composition, is noiseless and dustless. The walls and ceilings are of graduated tints from warm orange to light primrose, giving a rising sun effect, while orange curtains further harmonise with the colour scheme. The ante-room is designed for quick service, and is fitted with Frigidaire plant, Jackson patent tea boiler, stoves and other equipment as necessary, and is white-tiled throughout. There are two entrances, one from the end of No. 10 platform and the other from outside. Revolving doors are provided in each case. The new tea-room is open until 11 p.m., and the tariffs are at usual tea-room prices.



INTERIOR VIEW AND KITCHEN OF NEW TEA-ROOM AT KING'S CROSS. L.N.E.R.

T.O.T. Philharmonic Society in "The Lilac Domino."

PROBABLY but few who witnessed the T.O.T. Philharmonic Society's staging of "The Lilac Domino" at the Scala Theatre recently suspected that at the eleventh hour misfortune threatened the production owing to the sudden and regrettable illness of Mr. Alec Pleasance, who was to have played the Hon. André d'Aubigny. Luckily it was found that the services of Mr. Jamieson Dodds, who created the character in the original production, were available, and so, at short notice and without rehearsal, that gentleman took up the part, and a very fine thing he made of it, playing and singing with consummate ease throughout. It was something of a coincidence that Miss Gwenn Gibbs, who played Georgine, should have been affected by a cold of so severe a character that at each of the five performances it was deemed necessary to ask the indulgence of the audience on her behalf. Despite this drawback, Miss Gibbs gave an excellent performance, and was particularly good in the second act, when she learns, as she thinks, of her lover's perfidy. She was well supported by that clever little lady, Miss Doreen Howard, as Leonie Ford, "her friend," and by Miss Margaret Murdoch as the Baroness, her "social companion."

The men were good all round. In Messrs. Leslie Woollett, James Lewis and Thomas Dean the company possess a trio who have demonstrated their worth in the past, and who certainly went one better, as the saying

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is, in their latest rôles of Elliston Deyn, Prosper Woodhouse, and Norman Calmain respectively. Their terpsichorean antics in the second act constituted one of the best things in the production ; in this they were aided and abetted by Mr. Cyril Corker, who contrived to make the most of the somewhat thin humour of the part of the flirtatious multi-millionaire, Cornelius Cleveden. Mr. J. Belmont-Taylor made a picturesque figure of Caraban, and some effective work was forthcoming from Mr. William McIsack and Mr. Robin Hoff in the respective rôles of Maximilian and Parker. The operetta was beautifully dressed and mounted, and the stage work excellent—thanks, in a great degree, to Mr. William J. Wilson, the producer: with him, as the lawyers say, Mr. H. W. Blunden as stage manager, and Mr. J. Everson as assistant ditto. As before, popular Mr. Charles Lambert conducted the very efficient T.O.T. orchestra ; and once more all concerned are to be congratulated on a sound and admirable production.

Railway Speed in a Church Sermon.

We are only too pleased to find that among our readers, including many of long standing, are numerous ministers, Church of England, Nonconformist and Roman Catholic, and, no doubt, many of these gentlemen make occasional use of their railway interests to find illustrations to support points when speaking from the pulpit or platform. The Rev. J. F. Worsley-Boden, M.A., Rector of North Wingfield, sends a copy of the *North Wingfield Parish Magazine* for February containing a report of a sermon preached by him in the Parish Church on Sunday, January 19, on "Christianity and International Peace," in which he made appropriate use of railway illustrations in developing one of his points, as follows:—

"If I may take an example of the mistakes which are readily made by people who are not versed in the matters whereon they so readily speak, I would go far afield from Navies and Foreign politics (wherein I speak with no authority) and Churches (in which I am supposed to be a specialist) to a sphere where I am fairly well at home —to wit, Railways. A few years ago the newest and largest Great Western locomotive, named *King George V,* was conveyed across the Atlantic to represent England at the Baltimore Exhibition. This engine gave some very good performances on American tracks, and led to a report that her speed caused alarm even in that country of rapidity and acceleration. This report was solemnly received, believed, and repeated in this country ; and the fame of having frightened the Yankees has even been transferred to other locomotives in this country which have never crossed the Atlantic. Here is a good example of the errors which find their way into newspapers and of the credulity of readers. What actually happened was this. The Great Western engine, taking an American train between Washington and Baltimore, developed 75 m.p.h. at a point where a reduction of speed to 30 m.p.h. was due on approaching a sharp curve. The dynamometer staff telephoned to the footplate that the speed was excessive. And this very proper precaution led to the popular story that the English engine ran faster than the American track would bear. What immense nonsense! For in fact the speed of 75 m.p.h., although creditable enough, is daily exceeded at various points on English railways. Let me furnish a few examples.

"Starting from the line nearest home, we may note that 80 m.p.h. is a frequent occurrence on this (Midland) section of the L.M.S. Railway down Sharnbrook bank ; on the G.N. section of L.N.E.R., between Grantham and Peterborough, 80 m.p.h. is frequently maintained for several miles, and 89 was recorded last year. Recently the 'Queen of Scots' Pullman covered 27 miles in 21 minutes, touching 90 m.p.h. The Great Western daily runs from Swindon to Paddington, 77 miles, in 70 minutes ; this average of 66 m.p.h. means a frequent excess of 75 m.p.h. And if examples from the daily achievements of English Railways are insufficient to show the folly and futility of the report of the exhibition engine's dangerous speed in America, what of the American performances themselves? I give one example. The 'Broadwalk Flier' between Camden and Atlantic City (the starting and stopping points of what was once the fastest train in the world, the 'Atlantic City Flier,' whose daily schedule was 55 miles in 50 minutes), lately covered 25 miles in 18 minutes, an average of 83 m.p.h., touching a maximum of 93.

"This digression is sufficient to show by facts and figures the errors which can be conveyed, impressed and believed through irresponsible speech on a subject which might well be better understood in such a mechanical age as ours."

Early Irish Season Tickets.

The following notes, sent by a Dublin reader, Mr. J. F. Cherry, appeared recently in *The Irish Times*:—

"A friend recently showed me two cards by which, if other proof was wanting, he could tell the year of his father's birth.

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The cards were issued by the Dublin and Kingston Railway Company as subscription (season) tickets from Westland row to Rock ; the first—No. 916—covered the six months from October, 1843, and the other was for a similar period from October in the following year. Both the cards bear the wax seal of the Dublin and Kingstown rail-road, and are signed ' Jn. Pim, jun., Treasurer.' The age of the subscriber can be proved by the endorsement on the earlier issued card, ' under twenty-one years of age.' I wonder what reason the authorities had for identifying the passenger as a minor.

" The second card bears no such endorsement, and this should be proof that the holder reached manhood in that year. The railway, which was the first in Ireland, had been at that time just ten years in operation, and it is interesting to read the conditions made and the privileges given by the company, which warned the passengers that it ' does not hold itself responsible for any interruption that may take place in the intercourse along the railway, . . . or that there shall be room in the first-class carriages at any of the stations.'

" The season ticket holders of eighty-five years ago enjoyed more consideration from the railway company than is given to their followers to-day, but general conditions of life were much easier then than now ; passengers had not to be carried in such large numbers, and the company were seeking to create a traffic that they now strive to hold. The subscribers had, in addition to ' the free use of the Company's Cold Sea Bathing Places, *on week days only* (the italics are mine), the privilege of travelling to any station beyond their contract, and, for the return journey, of obtaining a ticket at one-half of the usual rates '; they seem to have also enjoyed certain concessions in the matter of carriage and delivery of luggage and parcels that were not extended to the ordinary passengers, as their tickets referred them to the schedule of special charges, but the company did not hold itself responsible for any property unless it was ' entered and paid for.' "

Handling Blackpool Traffic.

Mr. C. R. Prescott sends the following notes :—

" On the second Saturday in August, for a period of almost three hours, I watched, with increasing appreciation, this wonderful feat of transport. Passing trains, largely specials, averaged one per minute during that period ; twice the four tracks were occupied by four trains passing simultaneously, and several times I enjoyed the thrilling spectacle of two substantial trains running neck-and-neck. Most of the specials were 10-coach trains, others loaded to 11 or 12, and the two heaviest noted were 14-coach formations in charge of a 2-6-0 and a 4-6-0 Prince respectively. The most notable load was a special composed of 12 bogie coaches (57-ft. type) hauled by one of the well-known L. & Y. 2-4-2T's. (Even this was not the limit, for a week later, at Atherton (Central), a passing coast-bound special of 13 bogie coaches was 2-4-2T hauled.) To return to Kirkham ; the stock used was mainly of large, modern type, with centre-corridor coaches on specials bound for distant destinations. From the locomotive standpoint the outstanding feature was the astonishing predominance of the standard superheater 0-6-0's. Almost every train from the Midland section was so headed, and a large number from the L. & Y. section were in their charge, most of the rest being hauled by L. & Y. 0-6-0's. Representatives of both classes were, on occasion, showing remarkably clean pairs of heels. Trains to and from L. & N.W. stations were in the main hauled by L. & N.W. engines of the Prince, Experiment, 5-ft. 4-6-0, or George or Super-Precursor classes, though 2-6-0's and standard 0-6-0's were noted. The signal arms around Kirkham appeared to be in a state of perpetual motion, but, considering the traffic density, checks were commendably infrequent, a large percentage of the non-stopping trains passing at speed. In the case of trains using the coastal route *via* Lytham, a severe slack was, of course, a necessity. Although no stranger to this spectacle, I left full of admiration for both system and men that make possible this great feat.

" On the standard Monday-Friday services the Hughes 4-cylinder 4-6-0's were very prominent on the heaviest duties. The other duties, often weighty trains, were dealt with by compound 4-4-0's, standard 0-6-0's, and Aspinall 4-4-2's, with L. & Y. 0-6-0's and 2-4-2T's, new 2-6-0's and new Class 2 4-4-0's also appearing. It seemed quite strange to see so few L. & Y. Atlantics —once the backbone of these services—but I know they are a disappearing class. In over a fortnight's stay in St. Annes I never saw one L. & Y. 4-4-0 ; nor did I see a single standard 0-6-0 on goods work, though the latter traffic is admittedly light. The 2-6-0 engines were prominent on Sunday half-day excursions. Taking Talbot Road and Central stations together, the average number of half-day Sunday trips seemed to be around the 50 mark. Easily the most interesting of these was one from Blaenau Festiniog and Conway branch stations,

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stations west of Bangor to Holyhead, and Llandudno Junction. This was a 12-coach train bearing *The Welshman* roof-boards and hauled by Experiment class 4-6-0 No. 5454 *Sarmatian*.

"On August 15, at Carlisle, on the 10.5 a.m. ex Euston, I noted two coaches bound for Edzell—one a private saloon for the Maharajah of Alwar and the other a reserved coach for his staff. During the slack hours, trains between Tyldesley, Leigh and Kenyon Junction, and Kenyon, Leigh and Bolton, now run with two or three coaches only in place of the traditional four ; a sensible move, for plenty of accommodation is afforded, even with the reduced load. With the advent of the winter service, Barton Moss station, on the L. & N.W. Manchester-Liverpool line, was closed, which isn't a very surprising move when one considers the scanty population of that area, or of Chat Moss as a whole. At Southport, on August 29, one of the newest 2-6-0's—No. 13119—was noted on a Flower Show special. About 25, including one from Euston, were in on that day."

The Proposed Bridge at Charing Cross.

Mr. A. G. Waller, of Kensworth, near Dunstable, sends a pamphlet under this title which has been printed for him by Waterlow & Sons, Limited, and copies of which, presumably, will be sent free to any interested inquirer, though as a matter of courtesy we suggest that any who think it desirable to approach him should send a large envelope duly stamped. We gather that the pamphlet is intended to set forth the author's ideas, in that, following an introduction and a history of the present Charing Cross (or Hungerford) Bridge, he criticises the official plan and discusses the Royal Commission scheme and the Engineers' report proposals, and then refers to other schemes. These chapters lead to a section entitled "Where I Stand in Respect of Charing Cross Bridge," a description of the author's scheme, and a discussion of the traffic problems involved. Mr. Waller's scheme is mainly for a proposed northern access, but provides for the retention of a station at Charing Cross and for its adoption as the terminus for South London electrified trains, steam traction being entirely eliminated. The bridge would, therefore, be of double-deck design, the station having 12 tracks, the bridge 11, and, above, room for a 60 ft. carriageway, two 25 ft. grass and flower borders, and two 15 ft. pavements. By restricting traffic at the station to electric trains, fairly steep gradients could be adopted to meet traffic requirements, while the author's proposals provide for road approaches affecting thoroughfares extending a considerable extent. Besides the frontispiece, which sets out the scheme in general, there are included a view of the proposed bridge as seen from Waterloo Bridge, a detailed plan of the scheme, and a view upon the road deck, looking north.

Mr. E. H. W. Gardner's Puzzle Query.

The answer to this is, the 2.10 p.m. from Chester to Liverpool (Lime Street), which conveys two sets of through coaches from Holyhead, one departing at 10.25 a.m. and the other on the 12.18 p.m. Irish mail.

The first reply came from Mr. L. C. King-Wilkinson, of Preston, who has himself supplied interesting queries of a similar character, and gives the particulars as stated above. Mr. C. Taylor, of Cirencester, goes into detail, mentioning also that the 10.25 a.m. from Holyhead, which serves various intermediate stations, also includes through portions from Holyhead and Llandudno to Manchester, with the Pwllheli-Euston through carriages. The Liverpool coaches off the Irish Mail are combined with those of the 10.25 a.m. at Chester, but, although the Irish Mail also has Manchester coaches, these do not proceed from Chester to Manchester with the Holyhead-Manchester vehicles of the 10.25 a.m.

The Model Railway Club.

The Model Railway Club was founded in 1910 with the object of bringing together all those interested in the construction and working of model railways. To-day the membership numbers well over two hundred, and includes amateur constructors of all ages and degrees of skill, and represents every profession and calling. The Club holds an Annual Exhibition (particulars of the Ninth appear in our advertising pages). The exhibits cover a wide range. The largest locomotives are powerful enough to haul 20 or 30 passengers, and usually work all day during the Exhibition, giving rides to all and sundry ; the smallest locomotives can be held on the palm of the hand, but can be seen at work continuously hauling and shunting trains of their own scale.

Other branches of railway working and engineering are all represented. One may see models of coaches, wagons, signals, signal-boxes, interlocking frames, bridges, coal tips, turntables, &c. All these models are constructed faithfully to scale, and represent many hours of patient labour and research on the part of the constructor. Many of the finest examples of workmanship are the work of members who have

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no mechanical training but who have benefited by the counsel and advice of experts as well as by the experience of fellow-members. The Club is fortunate in having amongst its members experts who in every-day life deal with the problems of the working of our great railways, and many who are expert craftsmen. Model making, both commercially and as a hobby, is on the increase, and it is the aim and object of the Model Railway Club to do all it can to promote interest in the making and running of model railways, and to work for their improvement.

The Canterbury and Whitstable Railway.

THE following interesting communication has been received from the Rev. R. B. Fellows, who is shortly publishing a book on the Canterbury and Whitstable Railway:—

"In the interesting article on the Canterbury and Whitstable Railway in your March number it is stated that George Stephenson's first plan was for a line with no tunnel. It has been repeatedly stated in railway histories during the last twenty-five years that the original survey was made either by George Stephenson or by his assistant, John Dixon. The fact, however, is that the survey for the line for which the company first went to Parliament was made by William James—the plan and section, which I have inspected, are signed by him and dated October 29, 1824. The Act was obtained in 1825. William James certainly suggested, and at least informally surveyed, other routes between Canterbury and Whitstable—these had easier gradients, but were, in consequence, very circuitous. George Stephenson's connection with the railway began when the Bill was before Parliament. The promoters found that the cost of the line had been underestimated; they therefore called in George Stephenson to revise the estimates for them, with the result that the capital was increased by £6,000. The Bill thus amended was passed sanctioning the line *as surveyed by William James*. After that, much to James's annoyance, the promoters gave the construction of the line into Stephenson's hands. He suggested a terminus in a different part of Canterbury, and as this involved a deviation of more than 100 yards from James's plan, Parliamentary sanction was necessary. The plan and section were prepared by John Dixon in 1826, and this alteration, of about ¾ mile, was sanctioned by Parliament in 1827.

"We have Stephenson's own account of his connection with the railway in the evidence which he gave before the House of Lords Committee on the G.W.R. Bill in 1835.

He was asked: (Minutes of Evidence, 1st July, 1835, p. 315).

(Q.) With regard to the Whitstable Railway, if I understand you, you say you had nothing to do with the formation of it?

Reply. I had not.

(Q.) Did you survey the country for the purpose of finding the best line?

Reply. No: it was surveyed by another person. The Bill was sought by a person of the name of James and it was found when he came to Parliament he did not understand much about Railways, they then applied to us for our assistance. I told them they had far too little money; and I was not called to speak to it, but I sent someone down to point out the line.

(Q.) Were you examined upon it?

Reply. No.

(Q.) After the Act had passed what had you to do with it?

Reply. I engaged to send a person to lay out the line, and another person to superintend it."

S. & D.J.R. Locomotive Notes.

THE new running number in the L.M.S. series of No. 89, the 2-8-0 locomotive which was involved in last year's disaster at Bath, is 9679. A sister engine, No. 84, is No. 9674, indicating a definite series of renumbering. No. 17, one of the oldest of the 4-4-0 locomotives of the S. & D.J.R., has been numbered 302 in the L.M.S. series. This number was previously borne by an early Johnson (unrebuilt) 4-4-0. It is believed that the 0-4-4T No. 54 (formerly No. 1305 in the Midland stock) will receive its old number. The 2-8-0's, "Sentinels" and 0-6-0T's Nos. 19-25 will be renumbered in the L. & N.W. Division stock, and the others in the Midland Division stock. Presumably the few 0-6-0's that are now painted black with red lines will be repainted plain black. A certain amount of re-classification will be required. The 2-8-0's previously 5G are 7F when renumbered. It may be noted that 2-4-0T No. 28A, which was scrapped in 1928, was at the time of its breaking up one of the oldest engines in the country. It was built in 1861, as a 2-4-0 tender engine, by George England & Co., for the Somerset Central Railway. It finished its days on the Bridgwater branch passenger train service.

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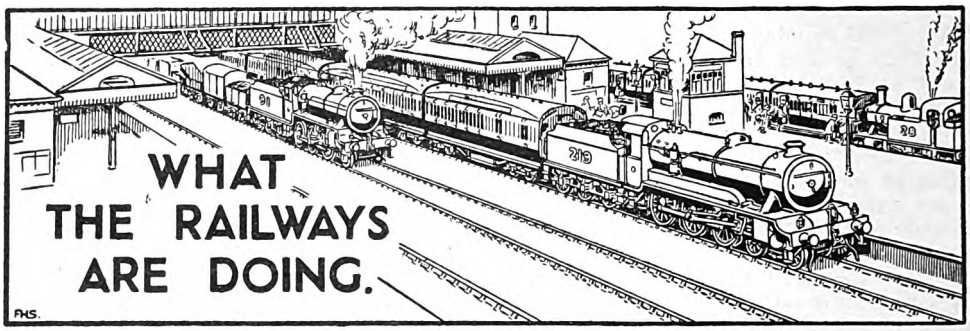

RECENT L.M.S.R. APPOINTMENTS.

THE following further appointments have been approved by the Directors:—

Chief Accountant's Department.

Mr. T. Clifton, Investigator of Expenditure and Costs, to be Assistant to Chief Accountant, Euston.

Chief General Superintendent's Department.

Mr. J. Smith to be Assistant Divisional Passenger Commercial Superintendent, Glasgow.

Mr. J. Hampson, Assistant District Controller, Liverpool (Lime Street, to be District Controller, Bletchley.

Mr. F. Marsden, Controller, Wakefield, to be Yard Master, Crofton Junction.

Mr. W. C. Keep, Stationmaster, Bletchley, to be Stationmaster, Southend.

Chief Goods Manager's Department.

Mr. G. S. Paterson, Goods Agent, Glasgow (Buchanan Street), to be Assistant to Goods Manager, Glasgow.

Mr. J. E. Papworth, Assistant District Goods Manager, Broad Street, to be District Goods Manager, Leeds.

Mr. L. C. Brittlebank to be Assistant District Goods Manager, Broad Street.

Mr. E. Overend to be Assistant to District Goods Manager (Cartage), Broad Street.

Mr. G. O. Chubb, Goods Agent, Uttoxeter, to be Goods Agent, Mansfield.

Mr. F. E. Bailey to be Goods Agent, Trafford Park and Manchester Dock.

Mr. T. Elsworthy to be Goods Agent, Langton Dock and North Mersey.

Mr. R. Clarke, Goods Agent, Carlisle, to be Goods Agent, Glasgow (Buchanan Street).

Mr. W. H. Kelly, District Traffic Agent, Carlisle, to be Goods Agent, Carlisle.

Electrical Department.

Mr. A. Taylor to be District Electrical Engineer, Crewe.

Mr. W. E. Porter to be District Electrical Engineer, Derby.

Mr. W. Handy to be District Electrical Engineer, Liverpool.

* * *

AT a meeting of the board of the Westinghouse Brake & Saxby Signal Co. Ltd. the following appointments were made:—Mr. H. G. Brown, Managing Director, to be Deputy Chairman; Capt. B. H. Peter, General Manager, to be Managing Director; Mr. W. H. Powell, General Business Manager, to be General Manager; and Mr. J. Griffith Hall to be Secretary in place of Mr. R. Payne, deceased.

MR. J. SMITH,

Appointed Assistant Divisional Passenger Commercial Superintendent, Glasgow, L.M.S.R.

* * *

LT.-COL. E. P. ANDERSON'S report to the Ministry of Transport in regard to the accident which occurred near Ridgmont, on the Bletchley-Bedford branch of the L.M.S.R., on October 21 last, has been issued. When the 6.45 p.m. up brick train from Forders Sidings to Bletchley had almost reached Ridgmont up distant signal the rear 35 vehicles broke loose, ran back on the wrong road for some 3½ miles down

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the gradient and collided violently with the head of the 2.30 p.m. up goods train from Cambridge to Bletchley, which was following in the same direction as the brick train. The fireman of the goods train was killed, and the driver and guard of the goods train, as well as the guard of the brick train, were injured. The brick train was drawn by 0-8-0 No. 9059. The goods train was drawn by 4-6-0 No. 5468. The accident was primarily due to the breakage of a coupling on one of the wagons, this coupling having internal flaws which no known method of external examination could have detected. The only blame attributed is to the driver of the brick train, and then merely to the extent of recognising some lack of judgment in trying to restart his heavy train on a grade instead of at once dividing it. It is suggested that additional catchpoints or their equivalent should be provided on the section.

* * *

A BATCH of three posters just to hand from the Southern Railway Company will specially interest all those who have faith in the slogan, "South for Sunshine." Two of the three are merely tinted—black or light brown, as the case may be, on the palest possible primrose background. One shows the intelligent features of a cheery and typical Southern Railway guard—in this instance "Sunny South Sam"; the other is a reproduction in little of the now famous picture of the diminutive would-be traveller—with satchel and shining morning face—interrogating, from the platform, the smiling driver of a south-bound locomotive. The third poster of the series is concerned with Exmouth—a nocturnal view of the front. It is brilliantly coloured and should look well—at a distance—on a station hoarding.

* * *

THE 11.15 a.m. "Queen of Scots" Pullman express to Glasgow—Driver W. Barnes, and Fireman J. C. Faithful, King's Cross, Engine 4419—was recently delayed 20 minutes *en route,* but arrived at Leeds at 2.42 p.m., the 186 miles from King's Cross to Leeds being covered in 187 minutes. The portion of the journey, Grantham to Doncaster, 51 miles, was run in 46 minutes (66.5 m.p.h.). The 9.10 a.m. East Coast Express, Newcastle to King's Cross, with the same driver, fireman and engine, was 31 minutes late from Leeds and was further detained 4 minutes *en route,* the train arriving King's Cross at 320 p.m., 186 miles in 188 minutes, the journey from Doncaster to King's Cross, 156 miles, being run in 149 minutes (62.8 m.p.h.).

MR. J. SMITH, who has been appointed Assistant Divisional Passenger Commercial Superintendent, Glasgow, Chief General Superintendent's Department, L.M.S.R., entered Caledonian Railway service in 1901 as a clerk in the Audit Department. After experience in the various passenger sections he was ultimately placed in charge of the season ticket section. In 1913 he was transferred to the Rates, Fares and Excursion Department of the Superintendent of the Line's office. On the formation of the London Midland & Scottish Railway he was appointed passenger rates clerk in the office of the Passenger Commercial Superintendent at Glasgow. In 1924 he was appointed Chief Clerk to the Passenger Commercial Superintendent, but during the last twelve months has been mainly engaged on matters concerning the development of road transport activities.

* * *

WE regret to announce the death of Mr. Richard Payne, F.C.I.S., Secretary of the Consolidated Signal Co. Ltd. from its formation, 27 years ago. He was also Secretary of Saxby & Farmer Ltd., McKenzie & Holland Ltd., and McKenzie, Holland & Westinghouse Power Signal Co. Ltd., and, for the past ten years, of the Westinghouse Brake & Saxby Signal Co. Ltd. Mr. Payne was well known in the railway world, and was an ardent supporter of the Railway Benevolent Association.

* * *

A SWINDON reader records that on February 20 a N.E. section 4-6-2 No. 2400, *City of Newcastle,* was noted at King's Cross, having brought in the up "Flying Scotsman."

* * *

MR. C. M. FURST mentions that among L.M.S.R. locomotives noted at Edinburgh in connection with the working of several trains conveying visitors to the Wales v. Scotland Rugby International Match were the following "Claughtons"—No. 6017 *Breadalbane,* No. 5915 *Rupert Guinness,* and No. 5979 *Frobisher,* together with "Royal Scots" No. 6125 *Lancashire Witch,* and No. 6134 *Atlas.* Incidentally, he noted two 11-coach trains of G.W.R. rolling-stock working from Cardiff to Edinburgh (Waverley), *via* the L.N.E.R.

* * *

COMMENCING on April 28, the through carriages connecting Manchester (Central) and Glasgow (St. Enoch) with Tilbury (Marine), in each direction, will be reinstated.

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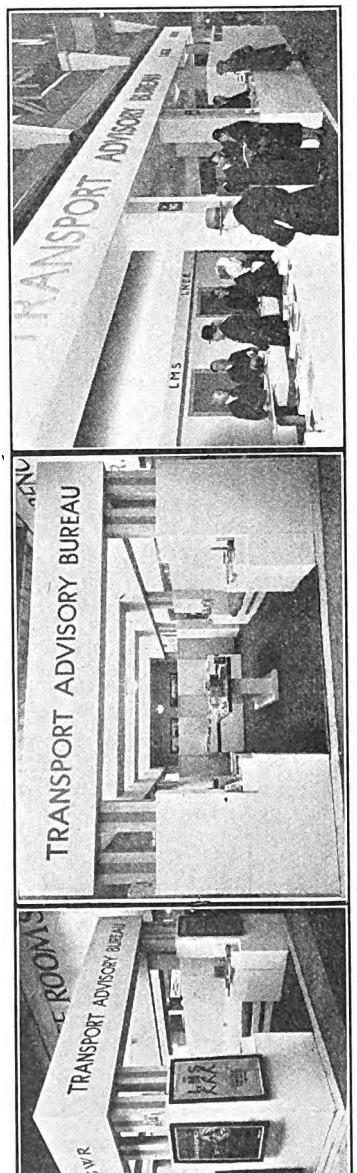
According to an announcement recently made in Montreal by Mr. E. W. Beatty, Chairman and President, Canadian Pacific Railway, more than $50,000,000 will be expended during 1930 on new equipment, new branch-line construction, and the improvement of existing equipment and roadbed.



BRITISH RAILWAYS TRANSPORT ADVISORY BUREAUX AT BRITISH INDUSTRIES FAIR, BIRMINGHAM, AND (ON RIGHT) LONDON.

* * *

Commencing on Sunday, April 13, the evening "Southern Belle" limited express from Brighton to Victoria will revert to its usual departure time, leaving Brighton at 10 p.m. and reaching Victoria at 11 p.m.

* * *

The London & North-Eastern Railway Company has placed a contract with Robert MacAlpine & Co. Ltd. for the earthworks, bridges, retaining walls and general work in connection with the proposed doubling of two miles of line between Romford and Gidea Park, and the reconstruction of Romford station and goods yard.

* * *

The Canadian Pacific "Trans-Canada Limited" will commence its 1930 season between Montreal and Vancouver on May 17, while "The Mountaineer," the company's fast through train between Chicago and Vancouver, begins its 1930 season's running on June 9.

* * *

Somerset and Dorset Joint Railway locomotives are now being painted in the standard L.M.S. style, and are being numbered in the L.M.S. series, according to their respective types and classes. The old colour of the coaches—Royal blue with gold lining—is to be replaced by the green of the Southern Railway. Prior to the present year, blue with gold lines was the standard colour for both locomotives and coaches on the Somerset and Dorset Joint Railway.

* * *

The G.W.R. announce that, as a result of increasing demand, 100 special trucks are to be built at their Swindon works for the conveyance of new cars from manufacturers' works (at Birmingham and Oxford) to all parts of the country and to various docks.

* * *

The 69th Anniversary Festival of the United Kingdom Railway Officers' and Servants' Association is to be held at the Trocadero Restaurant on Wednesday, May 28 next. The Right Hon. Lord Forres, P.C., Chairman of the Central Argentine Railway Limited, will preside.

* * *

Over a million "weekly" seasons have been issued by the Metropolitan Railway. Started as an experiment between a few "test" points, the scheme proved popular from the first, and now at every station

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throughout the Metropolitan system these useful seven-day tickets are obtainable.

* * *

HAINAULT station, on the Woodford-Fairlop-Ilford line of the G.E. section, L.N.E.R., was reopened for passenger traffic on March 3.

* * *

A FURTHER extension of through booking facilities to the Continent was brought into operation on March 31, by the G.W.R. in conjunction with the L.N.E.R. The new facilities operate from 38 provincial towns on the G.W. system *via* the Harwich route. The through fare includes transport by Metropolitan Railway across London to and from Paddington and Liverpool Street. Similar facilities brought into operation in conjunction with the Southern Railway last year have proved very successful.

* * *

THE March meeting of the Stephenson Society was held at the new headquarters, Mr. A. W. Croughton giving a lecture on "Little and Good" (Great North of Scotland) Railway. The last meeting of the winter session will be held on April 3, when Mr. W. A. Willox will read a paper entitled "Journeys in Germany," illustrated with lantern slides. The branches are also being well catered for, Mr. W. H. Whitworth, at Manchester, recently amplifying one of his papers with about 500 picture postcards taken by himself, whilst the Scottish meeting are being well patronised both in Edinburgh and Glasgow.

* * *

EXTENSIONS of the passenger and goods departments at Keynsham and Somerdale, on the old Paddington—Bristol main line of the G.W.R., have been authorised, to accommodate the additional traffic due to the erection of the new chocolate factory of Messrs. J. S. Fry & Sons.

* * *

AT the March meeting of the Railway Club a paper was read by Mr. C. R. Clinker on "Some Problems of Passenger Train Operation." It described the chief aims, such as public facilities, punctuality, economy, which passenger train operation should endeavour to achieve, and how all these different aspects were interwoven. In taking members behind the scenes the author showed how much had to be done to prevent passenger train operation from becoming chaotic, and to produce satisfactory results. The paper was followed with great interest, and in a short discussion which followed members expressed a desire that a summary of the paper should be available at some future meeting to be given up to a discussion on the main points. The opportunity will probably be given at the September meeting.

* * *

A REUTER message from Madrid states that the King of Spain has agreed to become Honorary President of the International Railway Congress, which will meet in Madrid on May 5 next.

* * *

SEVERAL readers point out that No. E853, Southern Railway, is *Sir Richard Grenville,* not *Lord Hawke,* as was stated.

* * *

WITH reference to Mr. Birkett's corrections of certain statements contained in Mr. C. Hamilton Ellis's article on the Lauder Light Railway, the author points out that (*a*) the bay at Fountainhall station is on the down side, as originally stated, in that the "Waverley Route," going in the Carlisle direction, is "down" both from the Scottish and from the L.N.E.R. points of view; and (*b*) "if Mr. Birkett will note the text of the article in question, he will find that the 'north-easterly direction' refers only to the section between the Galashiels Road crossing and the curve traversed before reaching Oxton station."

* * *

COMMENTING upon the reference in the February number to railway questions in examination papers, Mr. G. J. Aston states that some years ago he found the following question in a "General Paper" for scholarship candidates:—"Describe the features of interest to be seen in the course of a railway journey from (*a*) London to Chester, or (*b*) London to Exeter, or (*c*) London to Portsmouth." He adds the following comment:—"This was before the publication of the 'Through the Window' guide books. It is interesting to note that each of the three journeys admits of alternative express routes."

* * *

NEW 0-6-0 tender engines, commencing at No. 2251, are, we understand, under construction at Swindon, G.W.R.

* * *

A READER mentions that in connection with the Cup-tie, on February 15, between Brighton and Newcastle, the S.R., in conjunction with the G.W.R. and L.N.E.R., ran special trains. Six in all were run, leaving Brighton at 10.50, 11, 11.6, 11.25, 11.40 and 11.43 p.m., all of which, except the 11.43, were reserved seats. The return times from Newcastle were 10.10, 10.25,

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10.45, 10.58, 11.25 and 11.45 p.m. The route taken was from Brighton to Addison Road by the S.R., from there *via* Denham and Princes Risborough to Banbury, G.W.R., and from Banbury to Newcastle, *via* Leicester, Nottingham, Church Fenton, York and Darlington. From Newcastle a "Shire" class was used for the first stage, but it is not known if and where it was changed. It is believed that the engine in question was No. 256, *Hertfordshire*. From Banbury to Addison Road, G.W.R. four-cylinder 4-6-0 No. 4073, *Caerphilly Castle*, was used, and from Addison Road to Brighton 2-6-0 No. 797. First-class return fare from Brighton was 33s. 6d., and 20s. third-class.

* * *

ARRANGEMENTS have been made by the French State Railways for a Pullman car to run between Havre and Paris in each direction in addition to the usual restaurant car. A motor saloon is now used to convey passengers and baggage between the quay-side at Havre and the Gare des Voyageurs in the place of the old tram service.

* * *

COMBINING notes by "Sir Francis Drake" and S. Neuman, S.R. 4-6-0's Nos. E850, E852, E855, E857, E862, E863 and E864, also No. E477, have been fitted with smoke deflectors. No. E859 has coupled wheels 6 ft. 3 in. diam.

* * *

THE Board of Directors of the National Railway Company has decided to purchase several steam rail motors, of the British "Sentinel" type, in order to make comparative trials with the diesel motors now in use on the line between Ghent and Eecloo, says Reuter's Brussels correspondent.

* * *

MR. F. W. HOPPS points out, in regard to Mr. Tripp's article on "British Railways and Non-Railway Steamers," that the twin-screw steam yacht *Killarney* is now in the hands of Coast Lines, Limited (Langlands Services), and is used for pleasure cruises.

* * *

THE Great Western Railway has placed a contract with Guest, Keen & Nettlefolds, Limited, for the supply of 120,000 steel sleepers.

* * *

MR. L. C. KING-WILKINSON suggests another train service puzzle query, as follows:—"What residential town, the two principal stations wherein are termini, has four simultaneous departures—three from the principal terminus and one from the other terminus—and at what hour of the day does this occur?"

* * *

COMMENTING on the statement in the February RAILWAY MAGAZINE that 100 locomotives of the new L.M.S. 0-8-0 type (9500 class) were constructed last year, Mr. J. Leon Gerard calls to mind that, during 1872, no less than 150 locomotives were turned out of Crewe Works by the late L.N.W.R., and that during the whole of the Webb regime, 1872 to 1903, the output at Crewe was nearly 3,000 engines, an average of over 90 per annum.

* * *

MR. A. W. G. WATSON, of Edinburgh, sends a photograph (not reproduced) of M. & G.N. Joint Railway 4-4-0T No. 8, now working at Ormiston Colliery, Midlothian. Referring to Mr. Guyer's notes on M. & G.N. locomotives in the November number, Mr. Watson mentions that No. 9A is one of seven 4-4-0T engines built by Hudswell, Clarke & Co., of Leeds, between 1878 and 1881 for the then Eastern & Midlands Railway, and No. 8 is another of the class. It still bears this number, though now belonging to the Ormiston Coal Co. It has the original boiler with Salter valve on the dome, and on one side continues to bear the plate indicating that it was built (presumably rebuilt) at Derby in 1908.

* * *

MR. W. H. MCGRANAHAN, writing from Southern Cross, Western Australia, sends a copy of the *Western Mail* (Perth, W.A.), which contains reproductions of photographs taken on the occasion of the opening of the Lake Brown-Bullfinch Railway, a new line built as part of the Western Australian Government Railways to open up a new district. Mr. McGranahan himself witnessed part of the ceremony, and explains that Southern Cross, where he resides, has now an alternative route from Northam, the distance from Perth via Lake Brown being 296 miles, although the direct route through Merredin, 236 miles, is still the shorter. "Two trains a week come from Perth via Lake Brown and two leave here for Perth on the same route. Each takes nearly 24 hours to do the journey, compared with 10½ hours on the direct line. However, people between Lake Brown and Bullfinch are only too pleased to have a railway at all which opens up a good area of agricultural land."

* * *

MR. J. E. N. ASHWORTH mentions that trains from Yorkshire to Blackpool may

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travel either *via* Stansfield Hall, Burnley, Accrington, Blackburn and Preston (E.L. siding), or *via* Padiham and Great Harwood to avoid Accrington. Sometimes they use the left-hand line at Bamber Bridge and cross over the main line at Farington, joining the line at Farington curve junction and following the avoiding lines over the Ribble viaduct to the west of Preston station. Mr. Ashworth also states that the route over Holme summit is taken by certain trains all the year round, and is not restricted to seasonal traffic as suggested in the November number.

* * *

MR. A. RANSON COWLISHAW mentions that at Victoria, Southern Railway, he noted L.N.E.R. 0-6-2T No. 2658, with a six-wheeled van and three horse boxes. He also saw a six-wheeled coach, S.D.J.R., at Clapham Junction, on an empty train, proceeding towards Selhurst. Although he has been a regular user of Clapham Junction for nearly two years, and at various times before, this is the first time he has seen a S.D.J. coach there.

* * *

SUPPLEMENTING Mr. C. J. Coghlan's notes on "Railway Steamers," Mr. F. W. Hopps mentions that three other late L.M.S.R. steamers which were on Irish cross-Channel services, viz., *Duke of Argyle, Londonderry* and *Rathmore,* are now on the Tilbury-Dunkerque route, and named *Alsacien, Flamand* and *Lorrain* respectively.

* * *

A SCOTTISH reader states that a number of trains on the Cathcart Circle and Ardrossan lines (Caledonian section) have been worked regularly by Glasgow and South Western engines, and he has noted the following:—4-4-0's 14172, 14175, 14200, 14261, 14263, 14369, 14374, 14513 and 14517. Also 4-6-0 No. 14673 on the same sections. Compounds also work frequently on the Circle, and a new visitor to this section has been 4-4-0 No. 624 of the Midland Class 2 type.

* * *

LT.-COL. E. P. ANDERSON'S report to the Ministry of Transport on the derailment which occurred between Gartmore and Buchlyvie, on the Aberfoyle branch of the L.N.E.R., which occurred on October 1, has been issued. The 10.32 a.m. train from Aberfoyle to Glasgow, worked by 0-6-2T No. 2690, was derailed near Deepstone Pow bridge. Two passengers complained of shock or minor injuries, while two horses travelling in the horse-boxes on the front of the train were killed. The inspecting officer attributes the accident to the unsuitability of a heavy tank engine to this section of line, and expresses the opinion that it is undesirable to marshal light four-wheeled (unbraked but piped) vehicles between the engine and heavy bogie passenger stock.

* * *

THE following particulars show the numbers of locomotives of each wheel type in service on the Great Western Railway at the end of 1929:—Tender engines, 281 (4-6-0), 276 (4-4-0), 150 (2-8-0), 404 (2-6-0), 25 (2-4-0), 1 (0-8-0), 296 (0-6-0); total, 1,433. Tank engines, 30 (4-4-2), 175 (2-8-0), 305 (2-6-2), 35 (2-4-2), 99 (2-4-0), 5 (0-8-2), 508 (0-6-2), 1132 (0-6-0), 3, (0-4-4), 121 (0-4-2), 25 (0-4-0); total, 2,438. Grand total, 3,871. Mr. E. C. B. Ashford adds the following notes:—"Increases for the year were shown by the undermentioned types:—4-6-0 (65), 2-6-2T (15), 0-6-0T (10). The principal decreases were as follow:—4-4-0 (39), 2-8-0 (32), 2-4-0 (10), 0-6-0 (21), 2-4-0T (14), 0-6-2T (13), 0-4-2T (20). It will be observed that for the first time there are more 4-6-0's than 4-4-0's in service."

* * *

LT.-COL. A. H. L. MOUNT'S report to the Ministry of Transport on the collision which occurred on October 4, at Tottenham North Junction, L.N.E.R., has been issued. The 5.5 a.m. Liverpool Street to Norwich express, worked by 4-6-0 No. 2808, came into sidelong collision with the centre of the 2.45 a.m. down goods train, worked by 0-6-0 No. 7938, from West Green to Churchbury. Principal responsibility is placed upon the driver of the goods train, who erroneously assumed that the signal had been cleared for him, though certain other matters are touched upon in the report.

* * *

THE Annual General Meeting of the Railway Club was held on February 10. After the election of officers and other formal business had been disposed of, the President delivered an address on literature relating to the early days of railways. Among the interesting items displayed were the Act of 1804 incorporating the Oystermouth Tramroad, a plan drawn up and signed by Telford in 1810 for a cast-iron railway from Glasgow to the Tweed, and the original prospectus and plan of the Midland Counties Railway, dated 1833. An amusing production was the prospectus of the Dundalk Railway, 1837, in which one of the advantages claimed for the scheme was that horse-power, as opposed to steam, would be used.

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A NEW station, between Crystal Palace and Beckenham Junction, to be known as Birkbeck, was opened for traffic on weekdays and Sundays commencing March 2. All trains between Victoria and Beckenham Junction, *via* Crystal Palace, now call. The station has been built where the line crosses the Elmers End Road, and two flights of steps give access to the two platforms, at the entrance to each of which is a small booking office. The platforms, which are 520 ft. long, are of the modern type now adopted by the Southern Railway, faced with concrete and enclosed by a concrete fence.

* * *

FARM collection and delivery services are now in operation at 245 L.N.E.R. stations south of the Humber, while 690 railhead depots have been opened at their stations between London and Aberdeen. These depots, which range from small sheds to large warehouses, are rented by various firms desiring to store their goods at centres some distance from their works.

* * *

THE L.N.E.R. has placed contracts for 100 40-ton bogie plate wagons and 25 50-ton wagons. The last-mentioned wagons are primarily intended for the conveyance of bricks, but the vehicles are equally suitable for ironstone, slag and other heavy traffic.

* * *

THE "Underground" railways are making an alteration in the well-known route diagrams which are displayed in their railway cars. At the present time these diagrams show the route and stations of the railway concerned with the various interchange points. An experiment is now being made on the Bakerloo Railway, whereby the principal streets served by each station on the railway are shown on the diagram.

* * *

Two automatic boot-cleaning machines have been installed at Morden "Underground" station, and passengers may clean their boots free of charge. This innovation is due to the large quantity of mud which has been brought to the station by workmen employed on neighbouring building estates, but the appliances are also available for use by ordinary passengers. The machines are placed between the ticket barrier and the platform.

* * *

L.N.E.R. LOCOMOTIVE No. 10000 has been undergoing test runs between Edinburgh and Perth, and large crowds assembled at the various points to witness the arrival of the engine. The train was made up of 13 carriages and represented a load of 406 tons.

MR. W. E. ALLISON has been appointed Manager, Mail and Baggage Traffic, Canadian Pacific Railway, with jurisdiction over the company's railway and steamship lines.

* * *

A COMPETITION for prizes for the best-kept stations throughout the L.N.E.R. system will be held in 1930 on similar lines to last year. An inspection will take place during July and the first fortnight of August, and money prizes and certificates will be awarded; 328 prizes were awarded in last year's competition.

* * *

NEW G.W.R. LOCOMOTIVES.—The following new engines have been turned out of the Great Western Railway Company's Swindon Works since January 11:—Passenger 4-6-0 "Hall" class: No. 4972, *St. Brides Hall*; No. 4973, *Sweeney Hall*; No. 4974, *Talgarth Hall*; No. 4975, *Umberslade Hall*; No. 4976, *Warfield Hall*; No. 4977, *Watcombe Hall*; No. 4978, *Westwood Hall*; No. 4979, *Wootton Hall*; No. 4980, *Wrottesley Hall*. This list completes the "Hall" class. Goods or passenger: 2-6-2T, No. 5150. Goods: 0-6-0T, Nos. 5788-9; 0-6-0T, Nos. 7737-40 (North British Locomotive Co. Ltd.); 0-6-0T, No. 7700 (Kerr, Stuart & Co. Ltd.).

* * *

TWELVE new quadruple sets of the articulated type, each set consisting of 1 brake second, 1 composite (first and second class), 2 thirds, seating 40 first, 50 second, and 150 third-class passengers, and 29 other bogie coaches all fitted with the vacuum brake and steam heating, have been placed on the London, Hertford and Buntingford services, L.N.E.R.

* * *

THE Wimbledon and District Model Railway Club has added a correspondence side to its many activities. It has a very active membership, and during the summer months arrangements are being made for parties to make tours, visiting places of railway interest, in Germany, France, Austria and Switzerland. The Hon. Secretary, Mr. R. Shephard, of 27, Bernard Gardens, Wimbledon, London, S.W.19, will be pleased to answer inquiries.

* * *

AT the end of 1929, the locomotive stock of the Somerset & Dorset Joint Railway consisted of 80 engines. The respective types represented were:—4-4-0, 14; 0-4-4T, 12; 0-6-0, 26; 2-8-0, 11; 0-6-0T, 15; and 0-4-0T ("Sentinel" type), 2.

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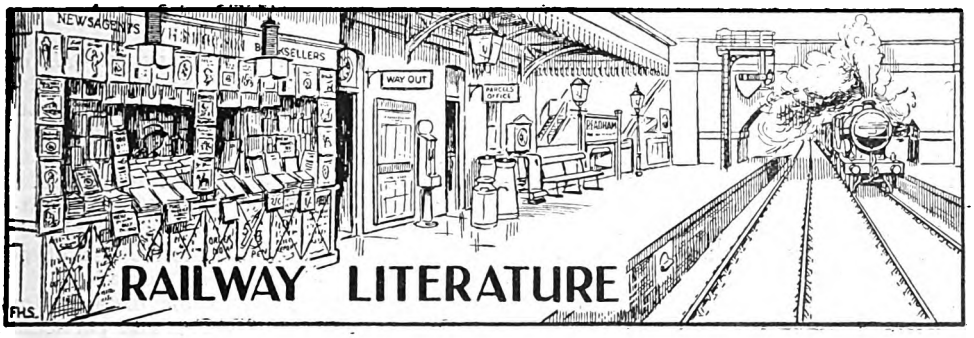

RAILWAY LITERATURE

THE LOCOMOTIVES OF THE SOUTHERN RAILWAY (WESTERN SECTION). Compiled and published by W. G. Tilling, 106, Great Dover Street, London, S.E.1. Price 3s. net. By post, 3s. 2d.

Mr. W. G. Tilling has now followed up his previous booklets dealing with the locomotives of other sections of the Southern Railway with one covering the locomotive stock of the Western Section. It is prepared in the same style, with a fine series of photographic illustrations, historical notes, a general review of the development of locomotive practice on the late London and South Western Railway, and notes on the locomotive situation on the Western Section since grouping, including reference to the use of engines previously associated with other sections. Leading dimensions are, of course, given, with various notes of interest. Reference is included to engines on the duplicate list and to narrow-gauge locomotives in use on the Lynton and Barnstaple line. A complete numerical record is appended, set out with a column for remarks. Other particulars cover renumbering and further matters essential to a correct record. A folding plate giving leading dimensions of the various classes completes an interesting volume, which can be cordially recommended to our readers.

HOLIDAY HAUNTS, 1930. London: Published by the Great Western Railway, Paddington Station, W.2. 1,040 pp. Price 6d.

A feature of the current issue of this ever-popular handbook is a special supplement containing useful information concerning mail, passenger and freight steamship services to all parts of the world. For the rest, the volume retains its useful and attractive features—particulars of apartments, boarding establishments, hotels, farm houses, estate agents, golf courses, announcements of special events, general information for travellers, &c. The illustrated descriptive section is remarkably well done, the many beautiful photographs used therein constituting the handbook's chiefest charm. In addition, there are a number of small maps of counties and, in a pocket at the end, a large general map, in colours, of England and Wales, showing the Great Western Railway system. A frontispiece in colour of Douglas from the sea (from a painting by Mr. Norman Wilkinson, R.A.) is deserving of special mention.

HINTS FOR HOLIDAYS. London: Published by the Southern Railway, Waterloo Station, London, S.E. 850 pp. Price 6d.

The outstanding feature of this railway guide book, as with the others, is the excellent collection of photographs which is used to illustrate the descriptive letterpress of the "health and pleasure resorts in the South and West of England served by the Southern Railway." Neatly printed throughout in light chocolate-coloured ink on a good quality white paper, "Hints for Holidays" contains a vast amount of information of a most helpful character relating to railway fares, cheap tickets, luggage in advance, list of guide books and other Southern Railway publications, golf courses in Southern England, points for travellers, reservation of seats and compartments, hotels and boarding houses, &c. Each county section is prefaced with a full-page map, and there is, in addition, a map of "The Sunny South" showing the Southern Railway routes and Continental connections.

THE HOLIDAY HANDBOOK. London: Published by the London & North Eastern Railway, King's Cross, N.1. 860 pp. Price 6d.

One railway handbook is—necessarily—very like another, but this year the L.N.E.R. have succeeded in introducing a feature that adds to the charm of their particular volume, viz., the use of different coloured inks in the printing of the excellent series of photographic illustrations to be found therein. Divided into four main areas: The Eastern Counties; Yorkshire; Northumberland, Durham and the Lake District; and Scotland, this handbook gives much impartial information and

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includes comprehensive lists of hotels, boarding houses, private houses, farms, &c., catering for visitors ; and, in addition, there is an admirable résumé under the title of "What to read when you get there," which reveals the literary association of many places not usually associated with novels and classical works. Maps of England and Scotland and plans of the principal resorts are also given. The red, black and gold cover is particularly pleasing.

HOLIDAYS BY L.M.S., 1930.—London: Published by the London Midland & Scottish Railway, Euston, N.W.1. 668 pp. Price 6d.

Enclosed in an attractively coloured picture cover this guide book is arranged in county order, each of the counties dealt with being preceded by a map ; a large map of the whole of England and Wales is also provided. The photogravure illustrations number 325 and are quite excellent. Nearly 600 places are described and a list of 5,000 hotels, boarding houses, &c., is given ; in addition, 476 golf courses and numerous camping sites are indicated. The guide appears to be as complete as it is possible to make it. Every available scrap of information has been included that will help the holiday maker to find a suitable location and, having found it, to get there with a minimum of inconvenience.

MR. C. F. KLAPPER, of 4, Wellington Road, Bow, London, E.C.3, sends a copy of the first issue of *The Omnibus Magazine*, published by The Omnibus Society. This is produced by a reproduction process, and is not printed, and within its 16 pages and cover a large amount of useful information is presented. It is, of course, the organ of the newly-formed Omnibus Society, of which Mr. Klapper is Hon. Secretary. So far, *The Omnibus Magazine* is designed to constitute the official organ of the Society, but arrangements have been made for individual copies to be supplied, price 7d., post free. Mr. Charles E. Lee contributes an article on "Railway Interests in Road Services," and Mr. W. N. Jackson, Hon. Treasurer, deals with the London Public Omnibus Co. Ltd. There are also numerous smaller items.

S.R. BOOKLET ON GOLFING.—A new edition of "Golfing in Southern England and on the Continent" has just been issued by the Southern Railway. The descriptive matter has been entirely rewritten and brought up to date by Mr. Robert H. K. Browning, the editor of *Golfing*, and it is fully illustrated by new photographs. In addition, there is a complete list of golf courses in the territory served by the Southern Railway with the distance from the nearest railway station and particulars of green fees, &c. The Continental Section has also been revised and gives information in regard to courses in countries as far apart as Czecho-Slovakia and Spain. Copies can be obtained free at any Southern Railway stations, or at principal tourist offices.

ACCIDENTS AND EMERGENCIES—THEIR SIGNS, SYMPTOMS AND "FIRST AID TREATMENT." By A. T. Gooding. Published by John Bale, Sons & Danielsson Limited, 83-91, Great Titchfield Street, London, W.1.

This little volume, which includes a preface by Mr. William Lock, L.R.C.P. & S.Ed., &c., and Mr. John Nicholson, M.A., M.B., Ch.B.Glas., is described as "an ideal memoriser and a quick reference." After a few introductory pages to enable later pages to be understood, the various classes of accident or emergency are set forth alphabetically, one column showing signs and symptoms and the other giving in a short paragraph advisable treatment. The book is intended for those already having a knowledge of "First Aid," and is not a text-book for beginners. It is compiled from the instructions laid down by the St. John Ambulance and British Red Cross Textbooks. The arrangement in sections, with index and a series of important "don'ts," help to render it a convenient and handy booklet for its purpose.

MESSRS. GRAFTON & COMPANY, of Coptic House, 51, Great Russell Street, London, W.C.1, send a supplementary list covering books of railway interest which they are prepared to supply. These cover works dating back to early days and in the middle era, as well as modern works, and include a number of items as to which there is a substantial demand among those interested in railway history and development.

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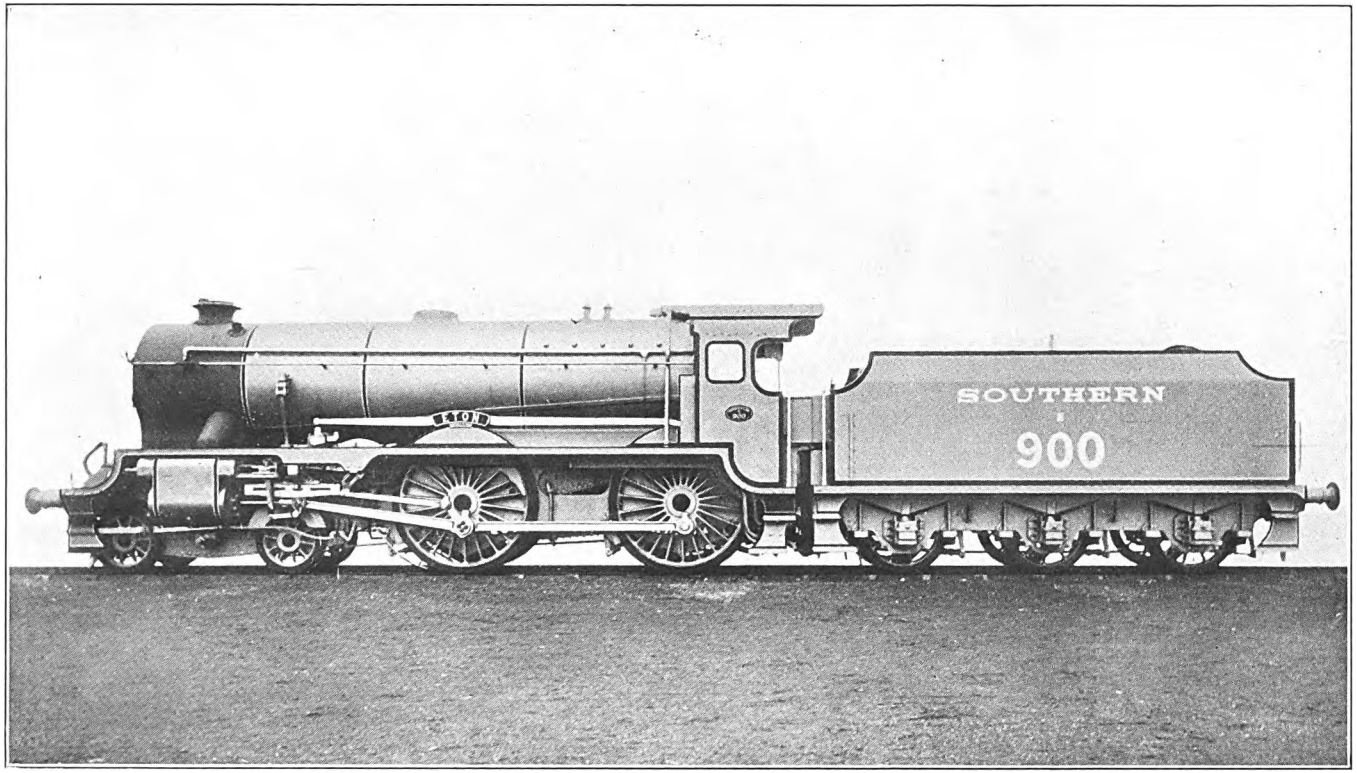

THE RAILWAY MAGAZINE.]

NEW THREE-CYLINDER 4-4-0 LOCOMOTIVE, SOUTHERN RAILWAY.

Designed by Mr. R. E. L. Maunsell, C.B.E., Chief Mechanical Engineer.

Cylinders (3), 16½ in. × 26 in. Coupled Wheels, 6 ft. 7 in. diam. Steam pressure, 220 lb. per sq. in.
Heating Surface—Large Tubes, 399 sq. ft.; Small Tubes, 1205 sq. ft.; Firebox, 162 sq. ft.;
Superheater, 283 sq. ft.; Total, 2049 sq. ft. Grate Area, 28.3 sq. ft.
Weight in working order—Engine, 67 tons 2 cwts.; Engine and Tender, 109 tons 10 cwts.

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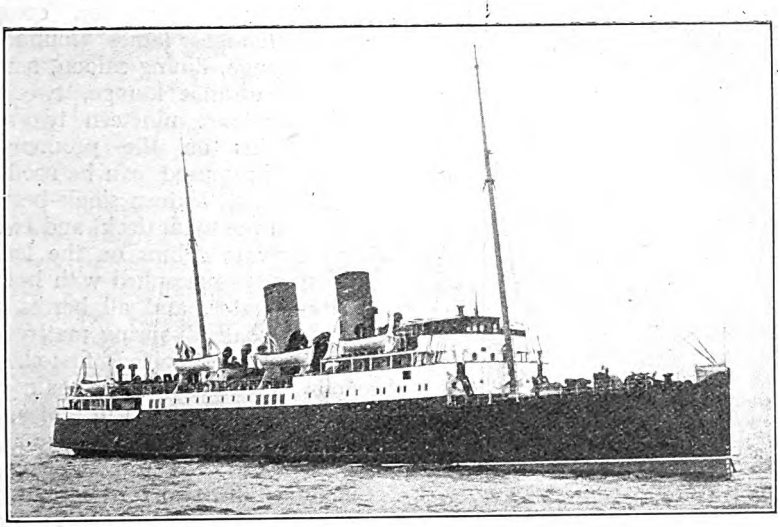

NEW S.R. STEAMER "ISLE OF JERSEY."

New Channel Islands Steamers, Southern Railway.

The "Isle of Jersey" began to run on the Southampton-Channel Islands service on March 12, and the "Isle of Guernsey" will follow shortly.

THE Southern Railway last year ordered two cross-Channel steamers from Wm. Denny & Bros., Ltd., Dumbarton, for their Southampton-Channel Islands service. The first of these, the *Isle of Jersey,* took up her first sailing from Southampton on March 12, and the second, the *Isle of Guernsey,* will follow shortly. These are sister ships and have a length overall of 306 ft. with a breadth moulded of 42 ft., depth moulded to main deck 16 ft., and a gross tonnage of 2,143 tons. They are larger than the vessels hitherto used in this service, the increase in size being possible through harbour extensions at St. Peter Port and St. Helier.

The problem which the Southern Railway Company's expert staff and the builders had to solve in connection with this trade was a peculiar one, inasmuch as the vessels operate on the night service on the outward run and the day service on the homeward run. It is therefore necessary to provide a large amount of sleeping accommodation under conditions as comfortable as possible, within the limits of a vessel this size, and, for the day run, to give ample promenade decks with sufficient space in public rooms below decks to provide shelter in inclement weather.

The vessels placed on this route in recent years have shown progressive improvements, but the two new vessels surpass in every way vessels hitherto running from Southampton to the Channel Islands. The provision of a little extra beam and greater depth has enabled the designers to give much greater width in the corridors and to provide larger cabins and give greater headroom. The vessels are certified to carry 1,400 passengers, of whom 800 are first class and 600 second class.

Everything possible has been done to

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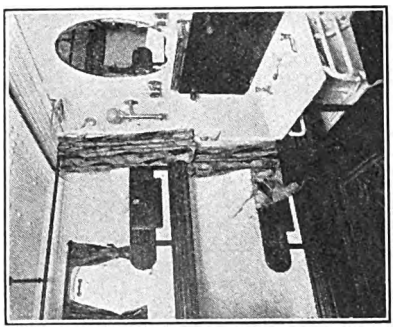
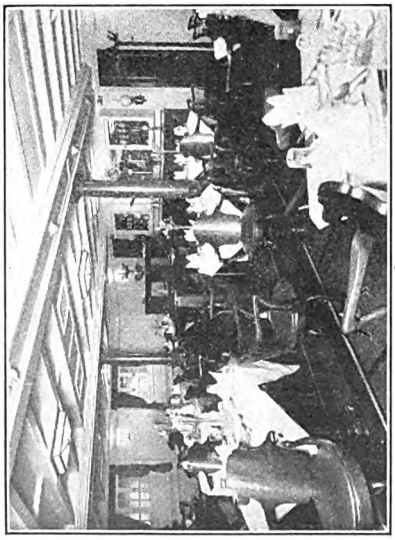
LADIES' GENERAL LOUNGE.



A TWO-BERTH CABIN.



FIRST-CLASS DINING SALOON.

ensure the comfort of the passengers. The first-class accommodation comprises a general lounge, ladies' lounge, gentlemen's lounge, dining saloon, smoke room and an entrance lounge, two two-berth *cabines-de-luxe,* nineteen two-berth private cabins on the promenade deck (which, if required, can be used as three-berth cabins), sixteen single-berth private cabins on the main deck, and twenty two-berth private cabins on the lower deck. All cabins are supplied with hot and cold running water, and all berths are fitted with Marshall Vi-spring mattresses. The attractively decorated first-class dining saloon is situated on the main deck, and seats 56 persons at small tables.

The second-class passengers are berthed in open saloons aft, two being provided for ladies and two for gentlemen. There is also a large second-class dining saloon on the poop-deck, seating 40 persons.

The first-class general lounge is on the promenade deck, and has fixed seating arranged for 56 persons. At the forward end of the fine entrance hall are situated the first-class ladies' lounge and the first-class gentlemen's lounge, each with sleeping berths for 28 persons.

Following practice which is now becoming very common, electric fans have been practically eliminated, the ventilation of the public rooms and state-rooms being effected by the Thermotank Punkah Louvre system, by means of which the temperature and direction of the air supply can be controlled by the passenger. Considerably more space than usual is available on the boat deck through the provision of a new type of davit, the Columbus davit, by means of which the lifeboats are slung high above the heads of the passengers. The vessel is propelled by two sets of Parsons type single-reduction geared turbines, steam being supplied by three Scotch boilers working at a pressure of 200 lb. per sq. in. The boilers are oil-fired.

A large number of guests were invited by the Southern Railway to inspect the vessel at Southampton on March 11, and to go for a short cruise in the Solent. Mr. Gilbert S. Szlumper, who presided at the luncheon on board, said he thought they would agree that in this ship they had arrived within measurable distance of the needs of the travellers.

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The Present-Day Locomotives of the L.M.S.R. [No. I.]

Published by the Courtesy of Sir Henry Fowler, K.B.E., Chief Mechanical Engineer, and Mr. G. H. Loftus Allen, Advertising and Publicity Officer, L.M.S.R.

AT grouping, detailed particulars were prepared for official use of all the locomotives which came into the L.M.S.R. stock from the component companies, and of the new numbers allocated to those which were re-numbered. Since then, however, considerable numbers of the older engines have been withdrawn and substantial numbers of new engines built. Further, there have been a number of cases of re-numbering and re-classification, so that as from October 5 last the old official engine-lists were superseded by a new one covering the entire locomotive stock as at that date. At the same time a useful summary of the locomotive classes and lists of named engines were prepared, and by courtesy of Sir Henry Fowler, K.B.E., Chief Mechanical Engineer, and of Mr. G. H. Loftus Allen, Advertising and Publicity Officer, we are privileged to commence publication of the particulars thus presented, information which, we have no doubt, will be widely welcomed by our readers.

As a first instalment we give a general summary of the engines now in service, engine numbers, type, motive-power classification and origin. The various initials used will, it is thought, be clearly understood without detailed explanation. In future instalments we hope to give a list of named engines, and to indicate within the various series of numbers, those which are now blank, due to scrapping, and other details of interest, with a few notes of a historical character.

Engine Numbers.	Type.	Motive Power Classification.	Origin or Class.
1–279	2-4-0 Passenger Tender ..	1	M.R.
306 & 311	4-4-0 ,, ,, ..	1	M.R.
329–562	,, ,, ,, ..	2	M.R.
563–612	,, ,, ,, ..	2	L.M.S. Standard.
701–777	,, ,, ,, ..	3	M.R.
900–1199	,, ,, ,, ..	4	L.M.S. Standard Compounds.
1201–1430	0-4-4 ,, Tank ..	1	M.R.
1431–1439	,, ,, ,, ..	3	N.S. " M " Class.
1441–1450	2-4-0 ,, ,, ..	1	N.S. " B " Class.
1454–1456	2-4-2 ,, ,, ..	1	N.S. " A " Class.
1457–1459	,, ,, ,, ..	1	N.S. " B " Class.
1506–1537	0-4-0 Freight Tank ..	—	M.R.
1550–1598	0-6-0 ,, ,, ..	2	N.S. " D " Class.
1601	,, ,, ,, ..	1	N.S. " Saddle."
1602 & 1603	,, ,, ,, ..	1	N.S. " K.S." Class.
1631–1899	,, ,, ,, ..	1	M.R.
1900–1959	,, ,, ,, ..	3	L.M.S. Standard (former M.R.).
2000–2039	0-6-4 Passenger Tank ..	3	M.R.
2040–2047	,, ,, ,, ..	5	N.S. " C " Class.
2048–2055	,, ,, ,, ..	4	N.S. " F " Class.
2056–2091	4-4-2 ,, ,, ..	1	L.T. & S.
2092–2109	,, ,, ,, ..	2	L.T. & S.
2110–2134	,, ,, ,, ..	3	L.M.S. (L.T. & S. Type).
2135–2150	,, ,, ,, ..	3	L.T. & S.
2180–2186	,, ,, ,, ..	3	N.S. " K " Class.
2193–2199	4-6-4 ,, ,, ..	3	L.T. & S.
2220–2233	0-6-2 Freight Tank ..	3	L.T. & S.
2234–2238	,, ,, ,, ..	2	N.S. " DX " Class.

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Engine Numbers.	Type.	Motive Power Classification.	Origin or Class.
2240–2245	0-6-2 Freight Tank ..	3	N.S. " L " Class.
2246–2269	,, ,, ,, ..	3	N.S. New " L " Class.
2270–2273	,, ,, ,, ..	3	L.M.S. (N.S. New " L " Class).
2290	0-10-0 ,, Tender ..	—	M.R. (Banker).
2300–2374	2-6-4 Passenger Tank ..	4	L.M.S. Standard.
2397	0-6-0 Freight Tender ..	2	S.M.J.
2398 & 2399	,, ,, ,, ..	1	S.M.J.
2400–2867	,, ,, ,, ..	1 & 2	M.R. The Class 2 Engines are as follows :— 2472, 2567, 2579, 2589, 2603, 2630, 2651, 2678, 2806, 2818, 2819, 2821, 2822, 2828, 2834, 2835, 2846, 2847, 2849, 2852, 2853, 2858, 2861, 2863.
2898 & 2899	0-6-0 Freight Tender ..	2	L.T. & S.
2900–3128	,, ,, ,, ..	2	M.R.
3130–3764	,, ,, ,, ..	2 & 3	M.R. The Class 2 Engines are as follows :— 3130–3136, 3138-3154, 3156–3159, 3161, 3163, 3164, 3166–3173, 3175–3177, 3182, 3184, 3190, 3195–3197, 3199, 3202, 3206, 3209, 3215, 3217, 3220, 3221, 3227, 3229, 3230, 3236, 3238, 3255, 3262, 3264, 3270, 3276, 3280, 3289, 3302, 3304, 3311, 3343, 3346, 3347, 3348, 3350, 3352–3354, 3358, 3360, 3362, 3366, 3372, 3375, 3377, 3380, 3382–3385, 3391, 3397, 3403, 3407, 3409, 3412, 3414, 3416, 3417. 3418, 3420–3425, 3430, 3432, 3434, 3437, 3438, 3445, 3451, 3455, 3460, 3461, 3465, 3466, 3470, 3471, 3473, 3475, 3477–3481, 3483, 3485, 3486, 3489, 3492, 3493, 3498, 3500, 3501, 3503–3505, 3508, 3511, 3512, 3516–3519, 3525–3528, 3530, 3533–3537, 3539, 3541–3543, 3545, 3547, 3549, 3551, 3552, 3554, 3555, 3559, 3561, 3564, 3566, 3567, 3569, 3571, 3576, 3577, 3590, 3592, 3601, 3602, 3603, 3609–3611, 3613, 3614, 3616, 3617, 3632, 3635, 3640–3643, 3646, 3648, 3649, 3655, 3659, 3666, 3677, 3688, 3689, 3691, 3692, 3695, 3696, 3699, 3703, 3704, 3706–3708, 3716, 3718, 3719, 3725, 3726, 3732, 3738, 3739, 3744, 3746, 3758, 3764.
3765–3834	0-6-0 Freight Tender ..	3	M.R.
3835–4026	,, ,, ,, ..	4	L.M.S. Standard (former M.R.).
4027–4556	,, ,, ,, ..	4	L.M.S. Standard.
4997–4999	2-6-0 — 0-6-2 Freight Tank	Not Classified.	Garratt.
5000–5104	2-4-0 Passenger Tender ..	1	L.N.W. Straight Links.
5110–5186	4-4-0 ,, ,, ..	2	L.N.W. " Renown."
5187–5319	,, ,, ,, ..	3	L.N.W. " Precursor."
5320–5409	,, ,, ,, ..	3	L.N.W. " George V."
5413	,, ,, ,, ..	3	N.S. " G " Class.
5450–5554	4-6-0 ,, ,, ..	3	L.N.W. " Experiment."
5600–5845	,, ,, ,, ..	4	L.N.W. " Prince of Wales."
5900–6029	,, ,, ,, ..	5 & 5x	L.N.W. " Claughton."
	The Class 5x Engines are as follows :—5906, 5908, 5910, 5927, 5946, 5948, 5953, 5957, 5962, 5970, 5972, 5975, 5986, 5993, 5999, 6004, 6013, 6017, 6023, 6029.		
6100–6149	4-6-0 Passenger Tender ..	6	L.M.S. Standard " Royal Scot."
6422–6434	2-4-0 ,, Tank ..	1	L.N.W.
6518–6757	2-4-2 ,, ,, ..	1	L.N.W.
6762	,, ,, ,, ..	2	Wirral. Purchased originally from L. & Y.
6780–6829	4-4-2 ,, ,, ..	3	L.N.W. " Precursor " Tank.
6864–6936	0-6-2 ,, ,, ..	2	L.N.W.
6950–6996	4-6-2 ,, ,, ..	4	L.N.W.
7100–7149	0-6-0 Freight Tank ..	3	L.M.S. Standard.
7207–7216	0-4-0 ,, ,, ..	Not Classified.	L.N.W.
7217	0-4-2 ,, ,, ..	,,	N.L. Crane.
7220–7455	0-6-0 ,, ,, ..	2	L.N.W. Special Tank.
7460–7502	,, ,, ,, ..	2	L.N.W. Saddle Tank.
7503–7532	,, ,, ,, ..	2	L.N.W. (N.L.).
7550–7841	0-6-2 ,, ,, ..	2	L.N.W.
7850–7869	0-4-2 ,, ,, ..	1	L.N.W.
7870–7899	0-8-2 ,, ,, ..	6	L.N.W.
7930–7959	0-8-4 ,, ,, ..	7	L.M.S. (L.N.W. Type).
8029–8084	0-6-0 Freight Tender ..	1	L.N.W. Special " DX."
8088–8313	,, ,, ,, ..	2	L.N.W. Coal.
8315–8624	,, ,, ,, ..	1 & 2	L.N.W. 5 ft.—17 in. and 18 in. cylinders.
	The Class 1 Engines have 17-in. cylinders and are Nos. 8320, 8321, 8322, 8324, 8325, 8327, 8330, 8332, 8366, 8605.		

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Engine Numbers.	Type.	Motive Power Classification.	Origin or Class.
8650–8664	0-6-0 Freight Tender ..	1	N.S. Class " E."
8668 & 8669	,, ,, ,, ..	2	N.S. " 100."
8673–8678	,, ,, ,, ..	2	N.S. " 159."
8681–8688	,, ,, ,, ..	3	N.S. " H."
8700–8869	4-6-0 ,, ,, ..	4	L.N.W. 19-in. Goods.
8901–8954	0-8-0 ,, ,, ..	6	L.N.W. " G1."
8957–8961	,, ,, ,, ..	4	L.N.W. " C."
8962	,, ,, ,, ..	6	L.N.W. " G1."
8963	,, ,, ,, ..	4	L.N.W. " C."
8964–8966	,, ,, ,, ..	6	L.N.W. " G1."
8969–9998	,,		
8969–8999	,, ,, ,, ..	3	L.N.W. " C1."
9002–9394	,, ,, ,, ..	5 & 6	L.N.W. " D," " G " and " G1."
	The Class 5 Engines are as follows :—9002, 9003, 9009, 9010, 9013–9017, 9028, 9035, 9038–9040, 9045, 9047–9052, 9055, 9056, 9061, 9062, 9063, 9068–9070, 9072, 9077, 9078, 9080, 9081, 9086, 9088–9090, 9095–9098, 9102, 9105–9110, 9113, 9117–9120, 9123, 9126–9130, 9134, 9136, 9138, 9141, 9143, 9145–9148, 9150, 9152.		
9395–9454	0-8-0 Freight Tender ..	7	L.N.W. " G2."
9500–9564	,, ,, ,, ..	7	L.M.S. Standard.
9600–9615	,, ,, ,, ..	6	L.N.W. " G1."
9616–9665	2-8-0 ,, ,, ..	7	M.M.
10100–10130	4-4-0 Passenger Tender ..	2	L. & Y.
10136–10146	,, ,, ,, ..	1	Furness.
10158–10179	,, ,, ,, ..	2	L. & Y.
10185–10188	,, ,, ,, ..	2	Furness.
10300–10339	4-4-2 ,, ,, ..	3	L. & Y.
10405–10433	4-6-0 ,, ,, ..	5	L. & Y.
10434–10474	,, ,, ,, ..	5	L.M.S. (L. & Y. Type).
10600–10617	0-4-0 Rail Motors ..	Not Classified.	L. & Y.
10621–10954	2-4-2 Passenger Tank ..	2 & 3	L. & Y.
	The Class 2 Engines are Saturated, and the Class 3 are Superheated. The Class 3 are as follows :—10835, 10877, 10882, 10885, 10890, 10891, 10893–10895, 10900–10954.		
11080–11085	4-4-2 Passenger Tank ..	1	Furness.
11100–11104	4-6-4 ,, ,, ..	4	Furness.
11110–11119	,, ,, ,, ..	5	L.M.S. (L.T. & S. Type).
11202–11257	0-4-0 Freight Tank ..	Not Classified.	L. & Y. " Pugs."
11270–11279	0-6-0 Dock Tank	2	L.M.S. Standard.
11304–11532	,, Freight Tank ..	2	L. & Y. " Saddle."
11535–11546	,, ,, ,, ..	3	L. & Y. (Outside Cyl.).
11553–11562	,, ,, ,, ..	2	Furness.
11568	,, ,, ,, ..	2	C. & W.
11601–11621	0-6-2 ,, ,, ..	1	L. & Y.
11625–11644	,, ,, ,, ..	3	Furness.
11803	0-8-2 ,, ,, ..	6	L. & Y. " Banker."
12015–12064	0-6-0 ,, Tender ..	2	L. & Y. (" Wright's ").
12065–12070	,, ,, ,, ..	1	Furness.
12083–12467	,, ,, ,, ..	3	L. & Y.
12469–12483	,, ,, ,, ..	2	Furness.
12484–12492	,, ,, ,, ..	2	M. & C.
12494–12512	,, ,, ,, ..	3	Furness.
12513–12514	,, ,, ,, ..	3	M. & C.
12515–12619	,, ,, ,, ..	3	L. & Y.
12701–12839	0-8-0 ,, ,, ..	6	L. & Y.
12840–12994	,, ,, ,, ..	7	L. & Y.
13000–13123	2-6-0 ,, ,, ..	4	L.M.S. Standard.
14010	4-2-2 Passenger Tender ..	1	Caledonian.
14100–14115	4-4-0 ,, ,, ..	2	Caledonian.
14116–14270	,, ,, ,, ..	1 & 2	G. & S.W.
	The Class 2 Engines are as follows :—14117–14121, 14123, 14126, 14128–14131 14133, 14136, 14137, 14158, 14160, 14169–14171, 14173, 14175, 14183, 14185, 14186, 14192, 14200–14227, 14246–14248, 14256–14270.		

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Engine Numbers.	Type.	Motive Power Classification.	Origin or class.
14271–14276	4-4-0 Passenger Tender ..	1	Highland.
14277	,, Freight Tender ..	1	Highland.
14278	,, Passenger Tender ..	1	Highland.
14284	,, Freight Tender ..	1	Highland.
14298–14325	,, Passenger Tender ..	2	Caledonian.
14326–14365	,, ,, ,, ..	2	Caledonian (except 14356 Class 3).
14366–14377	,, ,, ,, ..	2	G. & S.W.
14379–14422	,, ,, ,, ..	2	Highland.
14430–14476	,, ,, ,, ..	3	Caledonian.
14377–14508	,, ,, ,, ..	3	Caledonian.
14509–14521	,, ,, ,, ..	3	G. & S.W.
14522–14523	,, ,, ,, ..	3	Highland.
14600–14626	4-6-0 ,, ,, ..	3	Caledonian.
14630–14655	,, ,, ,, ..	4	Caledonian.
14656–14674	,, ,, ,, ..	3	G. & S.W.
14675–14693	,, ,, ,, ..	3	Highland.
14750–14761	,, ,, ,, ..	4	Caledonian.
14762–14769	,, ,, ,, ..	4	Highland.
14800–14803	,, ,, ,, ..	5	Caledonian.
15001	0-4-2 Passenger Tank ..	Not Classified.	Caledonian.
15010–15014	4-4-0 ,, ,, ..	,,	Highland.
15020–15031	,, ,, ,, ..	1	Caledonian.
15050–15054	0-4-4 ,, ,, ..	Not Classified.	Highland.
15103–15114	,, ,, ,, ..	1	Caledonian.
15115–15146	,, ,, ,, ..	2	Caledonian.
15148–15158	,, ,, ,, ..	1	Caledonian.
15159–15236	,, ,, ,, ..	2	Caledonian.
15237–15240	,, ,, ,, ..	2	Caledonian.
15245–15254	,, ,, ,, ..	1	G. & S.W.
15260–15269	,, ,, ,, ..	2	Caledonian.
15300–15307	0-6-4 ,, ,, ..	4	Highland.
15350–15361	4-6-2 Passenger Tank ..	4	Caledonian.
15400–15405	4-6-4 ,, ,, ..	5	G. & S.W.
16001–16039	0-4-0 Freight Tank ..	Not Classified.	Caledonian.
16040–16049	,, ,, ,, ..	,,	G. & S.W.
16081–16085	0-4-4 ,, ,, ..	,,	G. & S.W.
16104–16117	0-6-0 ,, ,, ..	,,	G. & S.W.
16119	,, ,, ,, ..	,,	Highland.
16151–16173	,, ,, ,, ..	2	Caledonian.
16202–16376	,, ,, ,, ..	3	Caledonian.
16377–16379	,, ,, ,, ..	2	G. & S.W.
16380–16382	,, ,, ,, ..	2	Highland.
16400–16749	,, ,, ,, ..	3	L.M.S. Standard.
16900–16927	0-6-2 ,, ,, ..	3	G. & S.W.
16950–16955	0-8-0 ,, ,, ..	4	Caledonian.
17002–17020	0-4-2 ,, Tender ..	1	Caledonian.
17029–17067	,, ,, ,, ..	1	G. & S.W.
17117–17210	0-6-0 ,, ,, ..	2	G. & S.W.
17230–17473	,, ,, ,, ..	2	Caledonian.
17474–17524	,, ,, ,, ..	2 & 3	G. & S.W.
	The Class 3 Engines are as follows :—17486–17493, 17497–17505, 17508–17524.		
17550–17692	0-6-0 Freight Tender ..	3	Caledonian.
17693–17704	,, ,, ,, ..	3	Highland.
17750–17764	,, ,, ,, ..	4	G. & S.W.
17800–17084	2-6-0 ,, ,, ..	3	Caledonian.
17820–17830	,, ,, ,, ..	4	G. & S.W.
17900–17915	4-6-0 ,, ,, ..	3	Caledonian.
17916–17930	,, ,, ,, ..	4	Highland.
17950–17957	,, ,, ,, ..	4	Highland.
17995	0-8-0 ,, ,, ..	6	Caledonian.

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Reminiscences of a Retired Great Western Railway Superintendent (III.)

By the late G. GRANT.

DEVIZES AND WELLS.

IN January, 1867, I took charge of the goods traffic accounts at Devizes—not an interesting task. On alternate Sundays I acted as stationmaster. There was only one line of rails east and west.

After being at Devizes a year, when not quite twenty years of age, I was given the position of stationmaster at Wells. It was not so large a town as Devizes, but a noted city. Like Bridport, it was the end of a branch ; the junction with Weymouth line was Witham. I had to do all the clerical work of the station. The Somerset and Dorset Company had a stationmaster there and three clerks.

The first train left at 6.40 a.m., the last arrived at 9.20 p.m. As there were eight intermediate trains, I had a long day. The staff consisted of a guard, a foreman, and three porters. A good deal of paper was made at Wookey, three miles away. We had consignments daily for "Passmore Edward's" new London evening paper, the "Echo."

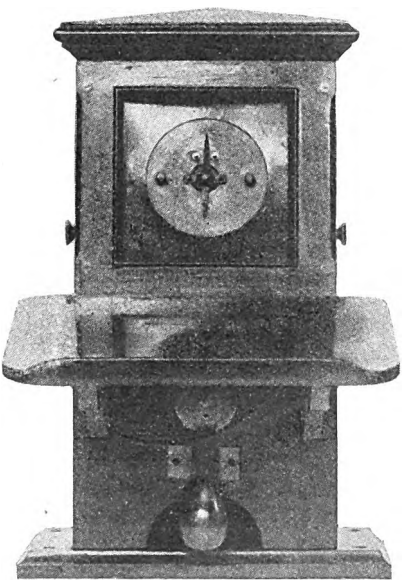
The Somerset and Dorset Company, owing to their geographical position, had a monopoly of traffic going west and south-west. They carried raw material at astonishingly low rates. As far as Witham Junction the passenger trains also conveyed goods wagons.

The issue of passenger tickets did not give much trouble. A notable event in the district was the Annual Flower Show at Shepton Mallett. In 1869, after I had issued 700 tickets in an hour, I was told by a railway critic I was very slow.

One day a point rod broke ; it was used twice every time a train arrived, and, as a blacksmith was close at hand, I had it repaired. The district engineer said it should have been sent to the depôt at Frome, 18 miles away, and for two or three days the points should somehow have been otherwise dealt with. I preferred to pay the tenpence.

The train went to Witham on one occasion without the authority to travel. Four officials at Wells, I was one, had been remiss. It occurred owing to a passenger coming after the train was due to leave. As there was but one engine working on the branch no serious result could occur. It was one failure in 6,000 journeys.

Officers at such places as Wells were left very much to themselves. This isolation had its drawbacks. One seemed in a backwater. I asked for a change, and had a telegram at once offering me a similar position at Melksham. Although I had been told it was the busiest station



SPAGNOLETTI TELEGRAPH INSTRUMENT.

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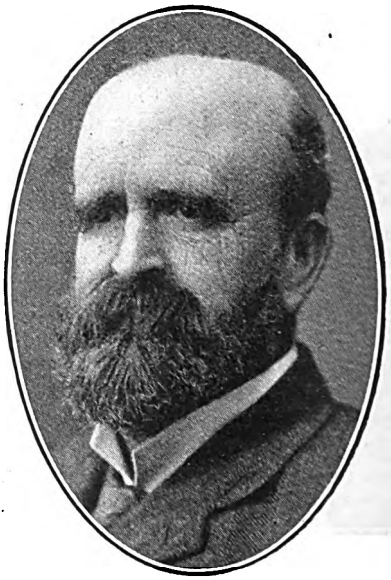
THE LATE MR. G. GRANT.

MR. C. S. DENNISS,
Assistant Superintendent at Shrewsbury, 1885-88, later General Manager, Cambrian & Cardiff Railways.

MR. E. HITCHCOCK,
Mr. Grant's Assistant, and later Divisional Superintendent at Chester.



MR. T H. GIBBONS,
Divisional Engineer at Plymouth while Mr. Grant was Divisional Superintendent.

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in the division for one man to manage, I had no hesitation in accepting it.

MELKSHAM.

Mr. Maggs, a well-known resident, showed me an old mug with the name spelt "Milksham," possibly owing to the rich grazing land, that was its original name. The inhabitants of Holt, Laycock and Semington—large villages—used this station. As I have said, this was considered the station with most clerical work for one officer.

An outline will show how my time was occupied. To issue tickets and attend to trains, beginning with the one at 7.30 a.m. and ten others, finishing at 8 p.m. and in summer at 9.40 p.m. After each train enter up tickets. In the morning intervals enter totals of previous day's invoices (65 entries), and post traders' ledger accounts. In the afternoon inspect premises, goods warehouse and sidings to see trucks were not being delayed. After tea make out 30 invoices for forward traffic. Enquire as to goods missing, damaged or received without invoice. Attend to correspondence in regard to claims, missing luggage, traders' complaints, delay to trains, &c. Make out daily return for Accountants' Office. At week-ends fill up forms for Superintendent and weekly traffic return. Check ticket issue for the week with train book. At the month end, between 1st and 9th, prepare all returns.

I had a foreman, three porters, and two pointsmen. The parcels porter, Loosemore, rose in one year from this position at 17s. to be a stationmaster at Bourne End at 29s., a record at that period.

One year, when I returned from holiday, the key I had would not fit the lock to the cash bag ; I asked that the correct lock should be put on the Melksham bag. I was told the fault was at Melksham. I wrote the relief man, his reply was ominous, "I must have left the wrong key." It transpired that he had been acquiring keys of cash bags and had been opening and abstracting money from them during the night. He paid the penalty.

From 1870 to 1874, the Great Western line, under Sir Daniel Gooch and Mr. Grierson, made great progress. Shares rose from 40 to 110. An important step had been taken in converting the South Wales line to the narrow gauge. I was told that while the matter was under discussion at the Board, Sir Daniel Gooch said it could not be done by a certain date for want of narrow-gauge engines. Mr. Joseph Armstrong intervened, "You alter the gauge, Sir Daniel, I will find the engines."

As to the merits of the respective gauges, in dealing with traffic, one was faced with the compulsory use of a heavy broad-gauge wagon to convey a load of two or three tons only. A narrow-gauge truck could carry ten. With a load of thirty trucks, an engine had to pull from forty-five to fifty tons more deadweight than with a narrow-gauge train. When the *Lord of the Isles,* with its wonderful size and eight-feet driving wheels, rolled into a station, it was an attractive picture of a perfect machine, but it was not economical to work.

Railway officers in the remoter parts of the country heard in 1872 what seemed to be at the time a fairy tale, that Mackenzie and Holland, at Worcester, were contriving to concentrate all the points and signals of a station into one cabin. To those used to the methods at that time, nothing seemed more impossible than that points could be worked from a cabin 350 yards away, and to be so interlocked with signals as to move in unison. Connect this with the then recently introduced "Block" system of securing a space interval between trains, and railway working would have attained a condition of safety that until then seemed impossible.

In the spring of 1872, Mr. Graham, the Bristol Superintendent, visited Melksham and suggested that as his Chief Clerk, Mr. Adye, was leaving I should apply for the position. I have his reply, dated May 14th, 1872, "I fear from what I hear the General Manager has selected a man for me."

SHREWSBURY.

In December, 1873, I went to Shrewsbury as chief clerk to the District Manager. The Manager was Mr. Tromp, who had severely criticised me when at Wells. His cordial welcome began a ten years' friendship.

In the change from a small station to assist in the supervision of a hundred, I had much to learn. The traffic was in coal, slates and bricks in North Wales,

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in timber, cattle and fruit in Shropshire and Herefordshire.

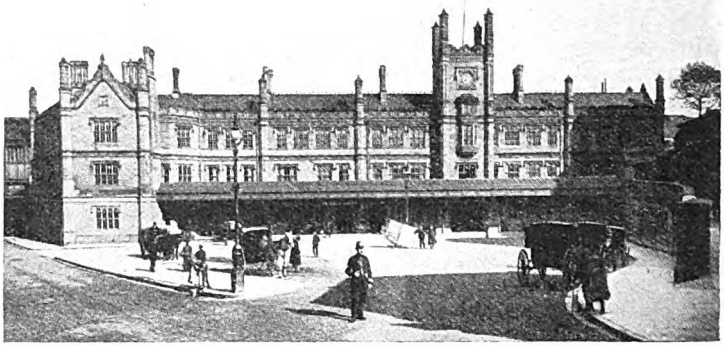
The office methods were primitive. No shorthand clerks, typewriters were in the future, there was not even a multiplex copier, all circular letters had to be handwritten. The system of letter registration gave much trouble when old papers were wanted until I changed it.

A perpetual anxiety was the examination every month of the returns of unpaid accounts. I had to see that no effort was omitted to collect them, that the company's staff was alive to the importance of the matter and honest. It is essential that the officer of a district who must know about all its business is the chief clerk. There were fifty stations in the district used in common with our partner, the London & North Western Company. I had often to meet their officers about staff accommodation or a more delicate subject, competition, as I refer to later.

Mr. Dennis, of Ruabon, was the doyen of the colliery directors, chairman of twenty-one companies. He saw his agents at 7.0, and at 9.0 a.m. could join the Liverpool train. Mr. Sturge, of the Plas Power Company, was keen to be sure that his rates for gas coal were on as low a scale as his competitors on other railways. Mr. Clayton, of Brynmally, was fond of a gossip ; once a colleague, Mr. Cope, and I had to listen to his opinions on current events for nearly two hours as a prelude to ten minutes of business. Mr. Barnes, of the Bersham Colliery, lived as frugally as one of his workmen. Blunt of speech, when Sir Thos. Ismay, chairman of the White Star Line, was condoling with him about a bad debt and asked him what he would do about it, Barnes replied, "Why, make honest people pay, your firm among others."

As all coal rates were arranged in the London office, I was generally the channel of communication between trader and railway and had at times to appear as Mr. Facing-Both-Ways to promote business.

In the early days small sailing ships came up the River Dee to Saltney wharf, near Chester, bringing iron ore from Barrow. A few were loaded with coal on the return. A noted trader there was Mr. W. L. Deeley, the father of Mr. Mallaby Deeley, and Frank Curzon.



SHREWSBURY STATION.

Thousands of tons of traffic were carried daily and the charges paid in due course. It was disputes or claims that led to correspondence.

I was often travelling somewhere between Snowdon and Wolverhampton, which meant spending many hours in the office after my return. A visit to Festiniog meant starting at 8 a.m. and returning at 11 p.m.

An interesting thing one saw up there was quarrymen's wives riding on the 2-ft. rail down the mountainside on three small wheels, holding their baskets, their seat a narrow piece of board, their only brake another little piece manipulated by hand.

Another part of Shropshire I had to oversee was the line between Wellington and Crewe, which formed part of the

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Great Western Company's route to Manchester. We had here to meet canal and rail competition.

When attending the monthly meetings I was brought into contact with officers of an older generation. The agenda of these meetings contained standard subjects, decreases in traffic. Expenses were the subject of much discussion. With outstanding accounts managers had to explain any increase as compared with last year—loading of wagons and trains. In 1879 Mr. Lambert was chairman.

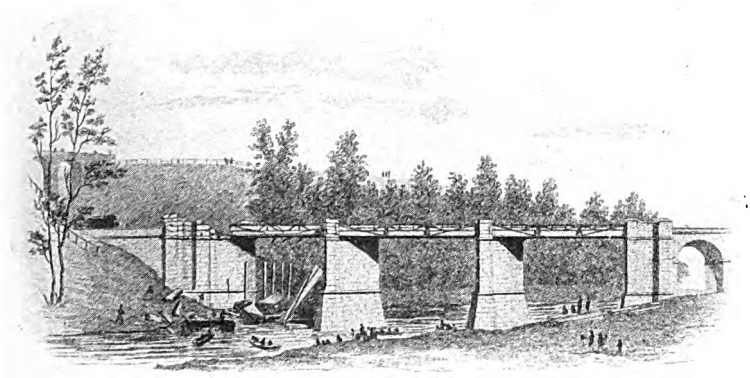
Among others I was friendly with Mr. Bill, District Manager at Birmingham, extremely reserved, very keen, a believer in discipline. He had for years to deal with a rapidly-growing traffic with very limited accommodation. Mr. Hearne, of Bristol, was courteous with a dignity nothing ever ruffled, abstemious and frugal to a degree.

There could not have been a greater contrast with him than Mr. Cleasby, the Worcester Manager. Smart, debonair, always decorated with a choice flower, he was altogether a man of the world. With this he combined extensive knowledge of railway law and practice. His services on occasions were utilised at Paddington.

Another member was Mr. Steele, of Liverpool; he was the Nestor of our circle. In early years he had been chief clerk to Mr. Allport, General Manager of the Midland line. His long beard and grave demeanour reminded me of the picture of Moses. Observing, reticent, never in a hurry to give his views, the chairman, after others had spoken, would appeal to him. His summary was brief, but the meeting was wiser for his practical suggestions.

While rates and conditions were uniform and agreed between the joint companies, the Great Western was at a disadvantage, as a large part of the traffic in the district went to Lancashire and Yorkshire, where we had no railway and our competitors were supreme.

If it be thought that I lay undue stress upon our efforts to obtain traffic, I have to point out that in addition to our formidable opponent, the L.N.W.R., there were others working with them, viz., the Cambrian, the North Stafford Company, the Wrexham and Connah's Quay Company and the Shropshire Union Canal Company.



DEE BRIDGE, CHESTER, ABOUT 1847.

Traffic between stations on joint lines was shared equally. That for local stations on either of the parent lines was outside competition. It was that passing to places where both had stations and to other companies' lines for which we contended. Because it was relatively small, the struggle was all the keener. There was no *laissez faire* in the contest. It taxed the wit and ingenuity of a canvasser to adapt his arguments to make his company's route appear the better.

Temperament, past transactions, little personal attentions, anything was used likely to influence a trader. Codlin was the "friend," but Short, the other fellow, was always on the doorstep with equally ingenious arguments. The most difficult question to answer was: "Will you reduce the rate?" It was fatal to

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say "No." Canvassers had to finesse, to defer an answer, and say that they would see the manager, that the matter should be looked into.

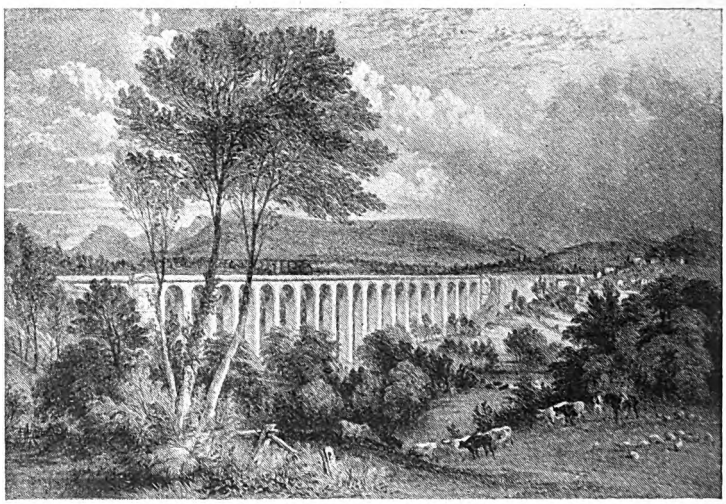
As the old generations pass, primitive methods of work are forgotten. To reach collieries up among the Welsh hills, inclines too steep for locomotives were in use. The loaded wagons descending were used to draw empty ones up. Half way on the incline was a double line where the trucks going in different directions passed each other. Four trucks made a load. A wire rope was attached to the first coming down and to the first going up. The rope on the former passed round a large drum which revolved as the trucks moved. When once in motion there were no means of arresting trucks unless the rope could be released. Until this was done the tractive power of those coming down continued.

A man stood at the foot of the incline, the actor in the play! As the vehicles approached at a speed of from twelve to fifteen miles an hour, it was his duty while the trucks were passing him to hit the pin of a coupling that released the rope. If he made the hit, the rope dropped. If he missed, damage resulted. While aiming his blow he had to keep clear of the fast-moving wagons. A failure meant smashing vehicles at the bottom and top. It can be realised what a keen eye, sure aim and personal courage were needed.

If he hit the pin, shunters, with wooden sprags and scotches, stopped the trucks where they were required. Coal trucks had no brakes at that time. If the pin was not hit, vehicles ran amok among others standing in sidings, those going up ran too far and tore the winding-drum from its position. This brief telegram used to come from Mr. James, the agent:

"Rope failed, trucks damaged, incline closed."

In the working of railways there may have been duties that demanded equal vigilance and courage, but I never encountered them. At the longer incline near Ludlow, a man rode on the first truck and by means of a wire rope pulled out the pin. A short steep reverse incline arrested the trucks.



DEE VIADUCT, CEFN.

Chester.

In November, 1891, I became Superintendent of the Chester Division. This included all Great Western lines north of Wolverhampton, as also that company's interests in North Wales. My transfer from the position of district goods manager was an unusual one. My experience as a stationmaster was an advantage. I had at all times loyal assistance from Mr. Hitchcock, the chief clerk, as also from Mr. Parry, in charge of the trains and train bill office.

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An earlier officer in charge at Chester was Mr. Kelley, a pioneer in the service. In very early days he was stationmaster at Steventon ; in 1851, at the time of the Hyde Park Exhibition, he was in a simiposition at Oxford. For a short period he was at Paddington ; while there he declined to sign plans by which Metropolitan trains at Westbourne Park were to cross the Great Western main line on the level. Subsequent events justified his opinion.

Procedure, except when I was absent, conformed to a time schedule. Mr. Hitchcock arrived at 8.30 a.m., examined reports from stations and inspectors. I came at 8.45 a.m. and opened post and important letters from Paddington. At 9.30 a.m. we conferred about our respective budgets. I indicated my views ; if a report was necessary a shorthand clerk was called in. By 11 a.m. I was at liberty to start on a tour of inspection or attend an inquiry or meeting of officers.

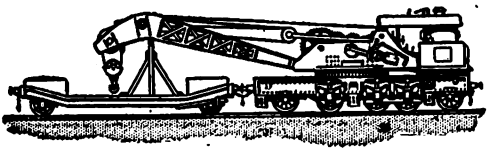
Being now responsible for the safety of the public, I had to be alert when travelling. To watch that due attention was given where the train did not call and at level crossings. That signals were promptly put to danger when a train had passed. At stations men should be on the platform when a train arrived to deal with luggage and parcels. During the journey I could examine carriages to see if they were clean and properly equipped.

I had only been at Chester a month when Christmas arrived. In the following twenty years there was nothing like it. A dense fog lasted for a whole week all over the country. Engine drivers were greatly perplexed. Where there was a signal post, unless a groundman had been appointed, the fireman had to climb the ladder to ascertain what the signal indicated. So many platelayers were required to serve as groundmen that some were on duty forty miles from their homes. Trains ran as they could ; two, four and six hours late. One goods train was 26 hours doing its usual journey of ten.

CHESTER STATION IN 1860.

(*To be continued.*)

(*Illustrations from E. T. McDermot's "History of the Great Western Railway."*)



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Southern Railway Reorganisation and New Appointments.

MR. F. H. WILLIS, Indoor Commercial Manager, has been appointed Secretary to the company in succession to Mr. Godfrey Knight, who retired on March 31.

The directors have agreed to a scheme of reorganisation of the Operating and Commercial Departments. Under the present system the Chief Operating Superintendent deals with all questions affecting the running of trains, and the Chief Commercial Manager deals with all questions affecting the procuring of traffic and the fares and rates to be charged. It has been found that this division of responsibility has not always tended towards the greatest efficiency, and it is with a view to achieving this that the new organisation has been decided upon. Under this scheme the two departments will be combined under a Traffic Manager. Associated with him will be a number of Assistants, representing the various operating and commercial activities of the railway, and Divisional Superintendents, who, with suitable assistants, will have charge within their districts of both operating and commercial matters.

The following is a list of the appointments made in connection with the formation of the new Traffic Department on the Southern Railway. The appointments apply as from April 1.

Mr. Edwin C. Cox, C.B.E., Chief Operating Superintendent, to be Traffic Manager.

Mr. J. B. Elliot, Assistant to the General Manager (Public Relations and Advertising), to be Assistant to the Traffic Manager (Development of Traffic).

Mr. H. E. O. Wheeler, O.B.E., Assistant Operating Superintendent for Train Services, to be General Assistant to the Traffic Manager.

Mr. F. Bushrod, O.B.E., Assistant Chief Operating Superintendent, to be Superintendent of Operation.

Mr. G. H. Wheeler, M.B.E., Superintendent, Somerset and Dorset Joint Railway, to be Commercial Assistant to the Traffic Manager.

Mr. F. A. Brant, O.B.E., Assistant to the General Manager for Continental Traffic, to act in the same capacity to the Traffic Manager.

Also the following:—

Mr. L. W. Judd, M.B.E., Chief Clerk to the Chief Operating Superintendent, appointed Indoor Assistant to the Traffic Manager.

Mr. G. H. Hare Dean and Mr. G. Arkell, appointed Assistants to the Traffic Manager for Statistics and Special Enquiry Work.

Mr. S. J. Roberts, Staff Assistant to the Chief Operating Superintendent. appointed Staff Assistant to the Traffic Manager.

Mr. H. Cook, New Works Assistant to the Chief Operating Superintendent, appointed New Works Assistant to the Traffic Manager.

Mr. E. J. Missenden, M.B.E., London (East) Divisional Operating Superintendent, to be Assistant Superintendent of Operation.

Mr. W. J. England, General Assistant to the Chief Operating Superintendent, appointed Assistant to Superintendent of Operation for Train Services.

Mr. S. Barter, Assistant for Rules and Regulation, to the Chief Operating Superintendent, to act in the same capacity to the Superintendent of Operation.

Mr. O. R. Buxton, Outdoor Commercial Manager's Office, appointed Assistant to Superintendent of Operation for Road Transport.

Mr. A. H. Lingard, Assistant to the Indoor Commercial Manager, appointed Deputy Commercial Assistant.

Mr. W. M. Perts, appointed Assistant for Rates and Fares to Commercial Assistant.

Mr. C. Cooper, Deputy Assistant for Continental Traffic to General Manager, to act in the same capacity to the Traffic Manager.

The following official notes indicate the principal features of the new organisation:—

The Traffic Manager will be responsible for the whole of the services hitherto

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[*Lafayette.*

MR. EDWIN C. COX, C.B.E., M.V.O.,
Chief Operating Superintendent, Southern Railway, who has been appointed Traffic Manager.

MR. F. H. WILLIS,
Appointed Secretary, Southern Railway.

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covered by the Operating and Commercial Departments, and will be assisted by:—

An Assistant for Development of Traffic, who is responsible for procuring passenger, freight, parcels and miscellaneous traffic, and taking steps to develop the traffic of the company under all these headings. He will determine the canvassing policy and instigate methods of campaign to be carried out by the Traffic Canvassers, whose work he will control through the Commercial Assistant.

A General Assistant, whose duty it will be to co-ordinate the work of the various sections and be generally responsible for the internal organisation of the Traffic Manager's Department.

A Staff Assistant, who will, through the heads of the different sections, control in a Central Office the whole of the staff engaged in the Traffic Department.

A New Works Assistant, who will deal with all questions of new works and the consideration of schemes prepared by the Engineer in connection therewith in readiness for submission by the Traffic Manager to the General Manager. He will also deal with applications for private sidings connected with the company's running lines or sidings.

The Superintendent of Operation will have general supervision of the movement of all traffic, both passenger and freight, together with the staff engaged therein, and be responsible to the Traffic Manager for the conduct of same. He will be assisted by:—

An Assistant Superintendent of Operation, who will carry out such duties as are assigned to him.

An Assistant for Train Services, who will be responsible for the compilation of public time-tables and service books for both passenger and freight train services, also for the working thereof; for the timing and working of the necessary special trains for excursions, boat and race and other special traffic; and for the distribution and cleanliness of the whole of the company's rolling-stock except cartage vehicles.

An Assistant for Rules and Regulations, who will be responsible for the preparation of the necessary rules and regulations, including block working, issued to the staff. He will also be responsible for the examination of schemes of signalling throughout the railway for submission to and approval by the Superintendent of Operation.

An Assistant for Road Transport, who will be responsible for the distribution of cartage, both mechanical and horse-drawn, throughout the railway in connection with goods and parcels traffic, and for the provision and co-ordination of passenger road services. He will also be responsible, subject to agreement with the Commercial Assistant, for dealing with delivery agencies and cab and omnibus privileges.

The Commercial Assistant will be responsible for the preparation of all fares, rates and charges in connection with passenger, parcels, freight and miscellaneous traffic conveyed by the company, and in relation thereto with other railway, road and steamship companies, and for the issue of season, traders', and all other tickets, for the publication and exhibition of the necessary bye-laws, and for the publication of all rates, charges and conditions for the transportation of all classes of traffic.

He will be responsible for all claims received by the company on account of passenger, parcels, miscellaneous or freight traffic. He will also be responsible to the Traffic Manager for making, subject to the approval of the General Manager, all contracts for the conveyance of freight and parcels traffic, including agreements with newspaper proprietors, and also the preparation of agreements with the Postmaster-General in regard to the conveyance of letter and parcels mails; for the preparation and submission to traders and others of the necessary statement of accounts, including those incurred for demurrage, siding rent, warehouse rent, &c., and for the collection of such accounts; and for the control of the canvassing staff in conjunction with the assistant for the development of traffic, and for the arrangement of their attendance at agricultural shows, exhibitions, fairs, &c.

He will be assisted by:—

A Deputy Commercial Assistant, who will carry out such duties as are assigned to him. Also:—

A Fares and Rates Assistant, who will have charge of the preparation of all fares, rates and charges, and also deal with all

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Elliott] [& *Fry*

MR. J. B. ELLIOT,

Appointed Assistant to the Traffic Manager (Development of Traffic), Southern Railway.

Elliott] [& *Fry*.

MR. H. E. O. WHEELER, O.B.E.,

Appointed General Assistant to the Traffic Manager, Southern Railway.

MR. F. BUSHROD, O.B.E.,

Appointed Superintendent of Operation, Southern Railway.

Elliott] [& *Fry*.

MR. G. H. WHEELER, M.B.E.,

Appointed Commercial Assistant to the Traffic Manager, Southern Railway.

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MR. E. J. MISSENDEN, M.B.E.,
Appointed Assistant Superintendent of Operation, Southern Railway.

Elliott] [*& Fry.*

MR. C. GRASEMANN,
Appointed Public Relations and Advertising Officer, General Manager's Office, Southern Railway.

MR. F. V. MILTON,
Appointed Superintendent of Advertising, Southern Railway.

MR. J. HARRAD,
Appointed Chief Assistant (Publicity), Advertising Department, Southern Railway.

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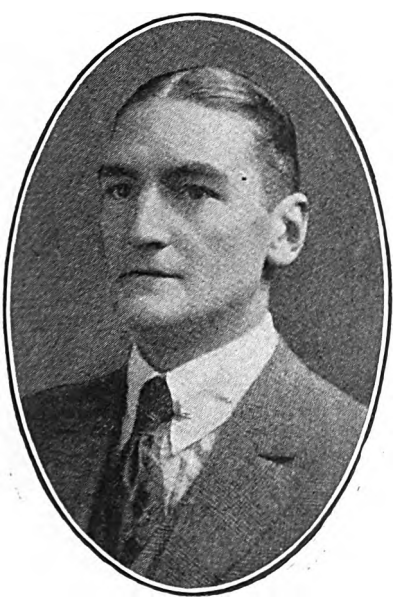
MR. A. WHITE, O.B.E.,
Appointed London East Divisional Superintendent (London Bridge), Southern Railway.

MR. C. J. C. LATHAM,
Appointed London Central Divisional Superintendent (London Bridge), Southern Railway.



MR. R. M. T. RICHARDS,
Appointed London West Divisional Superintendent (Waterloo), Southern Railway.

MR. E. HIGHT,
Appointed Southern Divisional Superintendent (Southampton West), Southern Railway.

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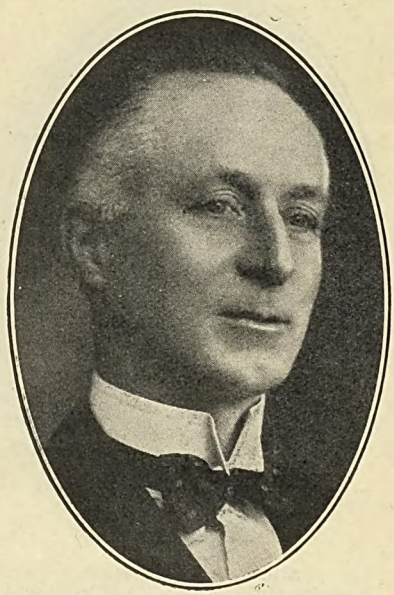
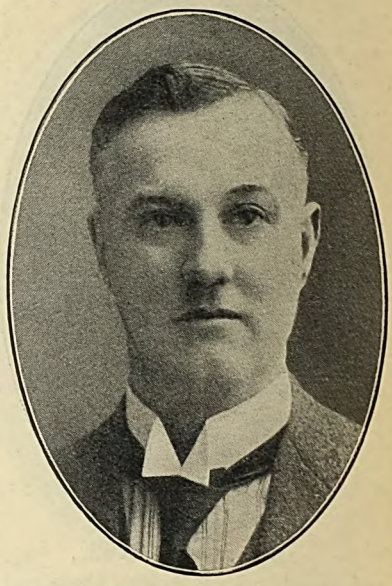
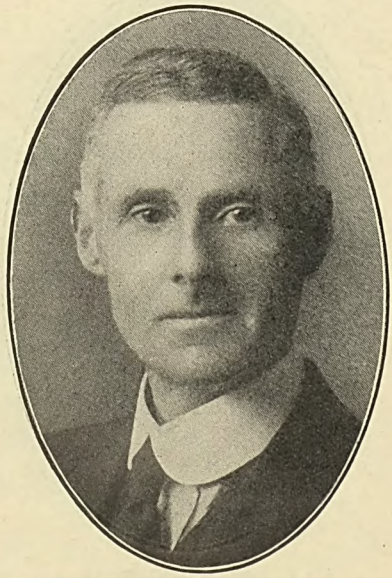


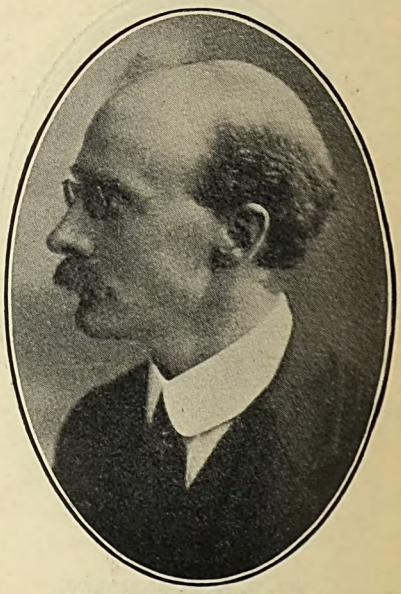
MR. D. S. McBRIGHT,
Appointed Western Divisional Superintendent (Exeter), Southern Railway.



MR. W. A. BROWN,
Appointed London District Freight Superintendent (London Bridge), Southern Railway.



MR. R. L. WHITWORTH,
Appointed South Coast Commercial Representative (Brighton), Southern Railway.



MR. L. W. JUDD, M.B.E.,
Appointed Indoor Assistant to Traffic Manager, Southern Railway.

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questions coming within the scope of the Railway Rates Tribunal.

The Assistant for Continental Traffic will control, under the Traffic Manager, the personnel and working of all foreign offices and agencies, including those in the Channel Islands ; will recommend any alternatives or additions to Continental services.

He will co-operate with the Docks and Marine Manager in all matters appertaining to the working of vessels under the control of the latter. He will be assisted by:—

A Deputy Continental Assistant, who will carry out such duties as are assigned to him.

The present system of Divisional Operating Superintendents and Divisional Commercial Managers is replaced by a new series of Divisions in charge of Divisional Superintendents responsible for both Operating and Commercial matters.

There are five Divisional Superintendents, who are responsible to the Superintendent of Operation for the working of all classes of traffic in their respective divisions, and to the Commercial Assistant for issue and carrying out of all instructions in connection with traffic charges, claims, &c., and the preparation of the necessary accounts. They are responsible to the Superintendent of Operation for the whole of the traffic staff engaged in their respective divisions, both at stations, town offices, &c., and appointments to the supervisory and clerical grades must be approved by him. (Exception: loading, &c., of traffic at London freight stations ; see London District Freight Superintendent.)

There is also a London District Freight Superintendent who is responsible to the Superintendent of Operation for the loading, unloading and checking of traffic at the London freight stations and offices, depots and wharves, and for co-ordinating the station terminal and cartage work thereat. He has control of the staff employed at these stations, &c. He is responsible to the Commercial Assistant for the issue and carrying out of all instructions relating to canvassing, traffic charges, claims, &c., in connection with the stations, &c., under his control, and for the preparation and submission of the necessary accounts.

There is also a Commercial Representative with headquarters at Brighton, who works under the direction of the Traffic Manager for development of the company's business, and watches their interests in the towns and holiday resorts of the South Coast, extending from Margate to Portsmouth. He works in close co-operation with the Divisional Superintendents in respect to all matters under their jurisdiction.

The Locomotive Running Superintendent is responsible to the Superintendent of Operation for:—

1. Provision of necessary engine power for traffic operation.
2. Economical arrangement of enginemen's duties.

The following new appointments apply in this connection :—

Mr. A. White, O.B.E., Eastern Divisional Operating Superintendent, becomes London East Divisional Superintendent, with headquarters at London Bridge. Assistant Divisional Superintendents, Mr. J. C. Dann and Mr. G. Bishop. Assistant to Divisional Superintendent, Mr. C. N. Anderson.

Mr. C. J. C. Latham, Southern Divisional Operating Superintendent, becomes London Central Divisional Superintendent, with headquarters at London Bridge. Assistant Divisional Superintendents, Mr. E. A. Sturges and Mr. S. W. Smart. Assistant to Divisional Superintendent, Mr. F. J. Wymer.

Mr. R. M. T. Richards, Assistant London (West) Divisional Operating Superintendent, becomes London (West) Divisional Superintendent, with headquarters at Waterloo. Assistant Divisional Superintendents, Mr. J. E. Sharpe and Mr. P. Nunn. Assistant to Divisional Superintendent, Mr. C. F. de Pury. Assistant for the Isle of Wight, Mr. A. B. MacLeod, Newport, who continues to act as Assistant to Chief Mechanical Engineer and to Locomotive Running Superintendent in the Isle of Wight.

Mr. E. Hight, Central Divisional Operating Superintendent, becomes Southern Divisional Superintendent, with headquarters at Southampton West. Assistant

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Divisional Superintendents, Mr. F. P. Watts and Mr. F. C. Bishop.

Mr. D. S. McBright, M.B.E., Western Divisional Operating Superintendent, becomes Western Divisional Superintendent, with headquarters at Exeter. Assistant Divisional Superintendents, Mr. S. G. Hartnell and Mr. C. S. Cobley.

Mr. W. A. Brown, Eastern Divisional Commercial Manager, becomes London District Freight Superintendent, with headquarters at London Bridge. Assistant, Mr. H. Robins.

Mr. R. L. Whitworth, Southern Divisional Commercial Manager, appointed South Coast Commercial Representative, with headquarters at Brighton. Assistant, Mr. L. Sears.

Consequent upon these appointments, Mr. C. Grasemann, Assistant Western Divisional Operating Superintendent, has been appointed Public Relations and Advertising Officer responsible to the General Manager, in succession to Mr. J. B. Elliot, appointed Assistant to Traffic Manager (Development of Traffic), as noted.

The following appointments also relate to this department: Superintendent of Advertising, Mr. F. V. Milton; Chief Assistant (Publicity), Mr. J. Harrad; Chief of Outdoor Section, Mr. H. E. Fry; Chief of Indoor Section, Mr. J. Davenport.

Mr. H. A. Sire, C.B.E., Chief Commercial Manager, and Mr. G. T. Hedge, O.B.E., Outdoor Commercial Manager, retired on March 31, also the following divisional officers:—

Mr. A. H. Hoyle, M.B.E., London (West) Divisional Operating Superintendent.

Mr. F. S. Bridge, London (East) Divisional Commercial Manager.

Mr. C. Giles, London (West) Divisional Commercial Manager.

Mr. J. P. Milton, Central Divisional Commercial Manager.

Mr. W. T. Venton, Western Divisional Commercial Manager.

L.N.E.R. 0-6-0 No. 8282.

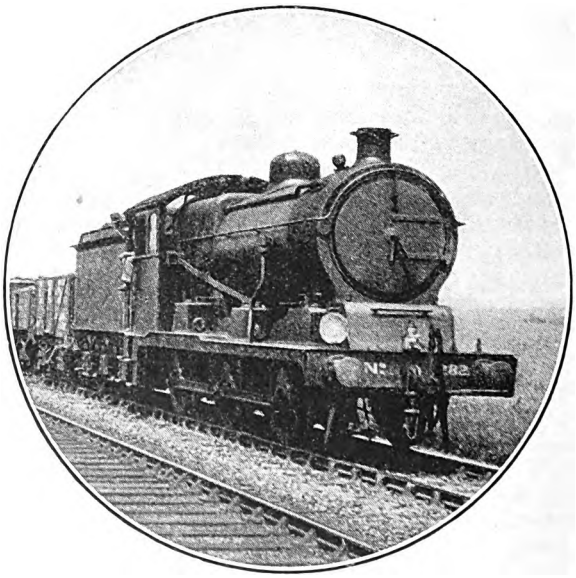

Photo.] [*E. R. Wethersett.*

G.E. SECTION 0-6-0 ON CAMBRIAN LINE GOODS TRAIN.

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New 4-4-0 Locomotives ("Schools" Class), Southern Railway.

The first of these Engines is illustrated as Frontispiece.

THE first of ten three-cylinder 4-4-0 type engines has recently been completed at the Eastleigh Works of the Southern Railway, to the design of Mr. R. E. L. Maunsell, C.B.E., Chief Mechanical Engineer. This class, which is officially known as the "V" class, will bear names of famous public schools in the South of England, as follows:—

Eton	E.900	*Tonbridge*	E.905
Winchester	E.901	*Sherborne*	E.906
Wellington	E.902	*Dulwich*	E.907
Charterhouse	E.903	*Westminster*	E.908
Lancing	E.904	*St. Paul's*	E.909

In accordance with the usual practice, the engine is largely built of standard parts, the cylinders, motion, bogie, &c., being virtually duplicate with the "Lord Nelson" four-cylinder class, while the boiler is similar to the "King Arthur" class, but has a shorter barrel and a working pressure of 220 lb. per sq. in. As a consequence the tractive effort of the three cylinders is no less than 75 per cent. of that of the "Lord Nelson" class, and this, together with a grate area of over 28 sq. ft., makes it the most powerful 4-4-0 type locomotive in this country. This notwithstanding, it has been possible to construct the locomotive within the composite loading gauge of the Southern Railway, and the inward set of the cab sides and the top of the tender gives additional clearance and thus enables the engines to be used on portions of the line where the loading gauge is more restricted. The adoption of a round-top firebox instead of a Belpaire was necessary on account of the limitation of weight.

Leading dimensions are:—

Cylinders (three)—	
Diameter	16½ in.
Stroke	26 in.
Wheels—	
Coupled, diameter	6 ft. 7 in.
Bogie, diameter	3 ft. 1 in.
Wheelbase—	
Coupled	10 ft.
Total	25 ft. 6 in.
Boiler, working pressure	220 lb. per sq.in.
Heating surfaces—	
Firebox—	
Width outside	4 ft. 0½ in.
Length	9 ft.
Large tubes	399 sq. ft.
Small tubes	1,205 ,,
Firebox	162 ,,
Total	1,766 ,,
Superheater surface (in.)	283 ,,
Combined total	2,049 ,,
Grate area	28·3 ,,

Weights in working order—	Tons.	Cwt.
On bogie	25	2
On coupled wheels	42	0
Total	67	2

Tractive effort at 85 per cent. of boiler pressure	25,130 lb.
Total wheelbase, engine and tender	48 ft. 7½ in.
Total weight of engine and tender in working order	109 tons 10 cwt.

The engine has a built-up single-throw crank axle, and the 8-in. diameter piston valves are driven by three sets of Walschaerts gearing. Laminated springs are adopted throughout, and hand sanding is provided. A vacuum pump, driven off the inside crosshead, is used to maintain the brake on the train, a 30-in. diameter vacuum brake cylinder being fixed under the footplate.

The tender is of the latest 4,000-gallon standard design on six wheels, each 13-ft. wheelbase. The coal capacity is 5 tons.

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THE RAILWAY PORTRAIT GALLERY.

MR. A. L. GIBSON,

Appointed Continental Traffic Manager London & North Eastern Railway.

MR. ARCHIBALD LESLIE GIBSON, who has been appointed Continental Traffic Manager, L.N.E.R., entered the service of the Great Eastern Railway in 1899 in the General Manager's office. During the war, Mr. Gibson was engaged on special duties in Paris. In 1919-20 he was attached temporarily to the company's General Continental Agency, which business took him to various parts of the Continent, where he is well known. In July, 1920, he was appointed Assistant Continental Traffic Manager, and in March, 1924, to the office of Continental Traffic Manager (South). Mr. Gibson was appointed on a special sub-committee (Railway Clearing House) to examine the Conventions of the International Régime of Railways and the International Régime of Maritime Ports. He was also nominated a member of the permanent sub-committee to report on railway questions of an international nature, and is a delegate of the International Union of Railways. He has been closely associated with the management of the Harwich-Zeebrugge train ferry service since its inception. Mr. Gibson is a Knight of the Danish Order of Dannebrog.

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BRITISH LOCOMOTIVE PRACTICE & PERFORMANCE.

By CECIL J. ALLEN, M.Inst.T., A.I.Loco.E.

CORRESPONDENCE continues to reach me in connection with the question of locomotive standardisation, and certain of these letters, bearing particularly on the subject matter of my February article, I desire now to quote. "There are several points," writes one correspondent, "which the average locomotive enthusiast is liable to overlook when eulogising or criticising modern British locomotive practice and performance. One is that the biggest and finest-looking locomotive is not necessarily the most suitable or the most economical for the work which it is called upon to perform. Each type is designed to do certain work, and to do it as cheaply as possible. Ultimate economy takes into account prime cost, fuelling, maintenance, and deterioration of road and structures.

"Another point is that every railway must possess a certain number of fairly light engines of handy types for sections on which larger machines are either impossible, for gauge or weight reasons, or uneconomical. I fail to see how the use of a 'Pacific' or a large 4-6-0 on a train weighing not much more than half its own weight, or perhaps equal to its weight, can be economical. Then, again, what are the actual facts in regard to the load increases which are claimed as the justification for the powerful locomotives of to-day? It is true that the crack expresses on nearly all routes are much heavier to-day than they were, say, twenty years ago; but is the average weight of passenger trains over the whole of a section or division much heavier than before?"

The writer then gives examples of train workings, which are now, *per contra*, lighter than once they were, or certainly no heavier, and are either no faster or are slower in overall times, though worked by considerably more powerful locomotives, and asks finally: "Why, then, do not the locomotives of to-day do better? I am not referring now so much to the latest 'Pacifics' or largest 4-6-0's as to the express engines of more moderate weight and power. The reason appears to be summed up in the one word 'maintenance.' Fully to explain this degeneration in maintenance would be difficult; shed economies are doubtless one reason, and the multiple-manning of engines is another. When the little 70-ton and 80-ton 4-4-0 tender engines of bygone days were doing such hard work—and getting little credit for it—they were kept in first-class order, and every ounce of steam was made to do its proper work. One never saw them enveloped in steam, from bad joints and faulty packings, every time they stopped at a station, nor blowing steam to waste through the safety-valves unnecessarily."

"For my own part," says another

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correspondent, "provided that an engine is economical, and has a margin of power in reserve over and above that required for its duties, I should say that it is a good policy to retain such engines in service. On the L.M.S. it would seem that with the 'Royal Scots,' 'Claughtons,' Class '8' 4-6-0's, 'Princes' and compounds there is sufficient power available. On the other hand, despite the economical running of big 4-6-0 engines on such lines as the G.W.R., it is surely a wrong policy to have 4-6-0 engines costing more than 4-4-0 engines running about on slow trains. Again, with road transport developments and future air progress, we may not see any serious increase in the future weight of the trains."

This last seems to me a particularly short-sighted letter. First of all, despite what is said in its last sentence, and in the previous letter, we are seeing constant and unceasing increases in the weight of the trains. Great Western 60-ft. corridor stock of the latest type weighs 34 tons per vehicle, or as much as the first 70 ft. coaches, though possessing 20 per cent. less seating accommodation. The new three-coach restaurant car sets on the "Cornish Riviera Express," of 108 tons' gross weight, replace a single car of less than 40 tons, and far more than swamp any economy derived from the abolition of the Exeter "slip." So much so, indeed, that at week-ends throughout the winter the down "Limited" is now almost invariably run in two parts—a thing hitherto unheard of—despite the advent of the "Kings." Standard L.N.E.R. corridor stock has gradually mounted in weight, in the last 15 years or so, from 29 and 30 tons to 34½ tons a vehicle, without any increase in accommodation, and on the G.N. & N.E. main lines of this system train-loads, in proportion to the passengers they carry, have probably risen in a greater ratio than on any other British line. The Southern Railway, which before the war was content with corridor coaches of 28 tons or so, now builds them at a standard weight of mostly 32 tons.

The L.M.S. is the only company which has succeeded in keeping coach-weight down, and on the Western Division the reduction in weight per coach from 30 and 29 tons to 28 and 27 has effected economies in the total weight of many of the expresses. But on the Midland Division the substitution of three-coach restaurant car sets for the more limited accommodation previously in use has wiped out this economy and put up the weight of most of the expresses. Secondary main line services are heavier than previously, by the almost universal substitution of corridor for non-corridor stock. As the older coaches gradually disappear, the same arguments apply to the local services, which to-day are for the most part made up of considerably heavier stock than heretofore.

These increases in coach-weight are doubtless largely due to the desire to compete more effectively, by offering increased comfort, with road transport, so that, in direct contradiction to the claim of the last letter, train-weights are likely to increase further. Again, unless the railways sit down and fold their hands in face of increased air competition—and it is devoutly to be hoped that this early policy in regard to road competition will not be repeated—it will be essential to use the weapon of acceleration which also, like heavier loads, calls for increased locomotive power. Railways which have provided themselves with ample locomotive power have, therefore, legislated for the future as well as the present, and this policy, on the face of it, appears preferable to that of letting the available power just catch up with maximum demands, and offer no further reserve.

Then, again, despite what my first correspondent wrote about the folly of basing upon appearances estimates of the suitability (or the reverse) of locomotives for their respective duties, I am not sure that both he and the other correspondent quoted do not fall into this very error. Why must the large engine on the small train be necessarily "uneconomical"? The steam locomotive is a remarkably elastic machine, and the response that it is able to make to wide variations in power demand is the chief reason why, despite its deplorably low overall thermal efficiency figure, the steam locomotive of traditional design continues to put up so good a fight against other sources of power for railways,

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and electricity in particular. But it is tolerably certain, as has been argued so often in these columns, that the engine of limited power, thrashed in order to maintain time on hard schedules, is likely to prove so much more costly in its fuel and maintenance charges as more than to counterbalance the increased constructional cost—or, rather, the higher rate of interest on the increased capital charge—of the larger locomotive. Let it be remembered also (and here again my correspondents base their deductions more on appearances than on facts), that locomotive constructional cost is far from increasing *pari passu* with weight and size.

Suppose, for the sake of argument, that the large 4-6-0 or 4-6-2 is seen on a slow or light train. How is the rest of its time taken up on that day or during that week? The arrangement of the average time-table is such that but few engines can occupy the whole of their day on duties of precisely the same character throughout—apart, that is, from insufficient turn-round margins, or, on the other hand, an undue proportion of idle time. In this connection there is much to be said for the enormous continuous locomotive mileages now becoming common in America, amounting, in one Southern Pacific case quoted in the March issue, to a run of over one thousand miles straight off; the point is that the large locomotive, representing an investment of no inconsiderable sum of money, is thus actually in use for the maximum possible amount of time on the duty for which it has primarily been designed.

Similar considerations prompt the use of our large engines on some trains which are of light formations, in order that their time may be filled up to the maximum between the heavier duties, and that they and their crews may be returned to their home stations. But, even then, is the big engine working in an uneconomical way on the light duty? There may be an infinitesimal increase in wear and tear of track, due to its use in place of a smaller engine, and interest on the heavier capital cost of the machine is another infinitesimal item; there is little or no difference in coal consumption. On the other hand, if a small-powered engine were employed on these light duties, and then had to take its turn on the trains calling for maximum power output, coal consumption would rise out of all proportion, and with it, probably, maintenance charges. Or, alternatively, piloting would be necessary, entailing the cost of two locomotive crews, the light working of the assisting engine back to its base, and still higher fuelling expense.

For the working of lighter and slower traffic, where locomotives can be confined to this type of duty and no other, each of the groups has many engines of earlier types still available. For further service of the same character 4-4-0 engines have been built recently by the London and North Eastern and Southern Railways in limited numbers, and of roughly the maximum power that can be mounted on this arrangement of wheels, but by the London Midland and Scottish in very large numbers (only 50 express engines of superior power—the "Royal Scots"—having been constructed of recent years), and in two designs, one of which, the "Class 2," is of but moderate power. The Great Western Railway has for years past built nothing but 4-6-0 locomotives for express passenger work, and it would need a hardy critic to stigmatise Swindon locomotive practice as uneconomical or inefficient. I mention these facts in an endeavour to prove that, rightly or wrongly, the preponderance of opinion in locomotive circles in Great Britain is at variance with this aspect of the L.M.S. locomotive policy; and readers will remember that the original discussion, out of which this correspondence arose, was based on that policy.

For such express train services as those between Euston and Birmingham, the Midland 4-4-0 compounds are undoubtedly ideal engines. Few British types, probably, have been more roundly abused than were the compounds on their introduction to these services, but the fault clearly lay with the conservatism of the drivers rather than the incapacity of the engines, as I strove to point out, with no uncertain emphasis, at that time. But the wheel has now gone full circle, and from all accounts it appears that few engines could be more popular with their drivers than the "Crimson Ramblers" have now become.

Their prowess in the working of services

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L.M.S. EUSTON—COVENTRY.

Distance.	Engine, 3-cyl. comp. 4-4-0, No. .. .. Load (tons tare) .. .. ,, (,, full)	Schedule.	1171 231 245	1056 253 265	1056 255 270	1054 256 270	1053 286 300	1164 301 320
Miles.		min.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.
0·0	EUSTON	0	0 00	0 00	0 00	0 00	0 00	0 00
1·0	*Mile-post* 1	—	3 06	3 24	3 26	3 01	3 49	—
							p.w.s.	
5·5	WILLESDEN JUNC. (5½)	9	9 15	9 29	9 50	9 09	11 15	11 15
10·0	*Mile-post* 10	—	13 47	13 51	14 37	13 49	15 50	16.00
14·5	*Mile-post* 14½	—	18 25	18 17	19 34	18 42	20 25	20 55
17·5	WATFORD (17½).. ..	22	21 17	21 01	22 33	21 50	23 20	24 05
21·0	King's Langley (21) ..	—	24 37	24 15	26 05	25 26	26 47	27 30
24·5	Boxmoor (24½)	—	28 01	27 30	29 40	29 05	30 15	31 10
						p.w.s.		
28·0	Berkhamsted (28)	—	31 34	30 56	33 25	33 02	33 55	34 57
31·0	*Mile-post* 31	—	34 42	34 00	36 46	37 24	37 10	38 27
31·6	TRING (31⅝)	38	35 21	34 41	37 30	38 13	37 55	39 13
40·3	Leighton (40¼)	—	42 43	42 05	45 13	46 02	45 33	46 42
46·6	BLETCHLEY (46⅝) ..	51	48 18	47 39	51 05	51 42	51 09	52 20
52·4	Wolverton (52⅜)	—	53 24	52 39	56 10	56 41	56 10	57 30
59·9	ROADE (59⅞)	63	60 40	60 08	63 23	63 37	63 13	65 00
62·8	BLISWORTH (62¾) ..	66	63 34	63 10	66 11	66 19	66 01	68 00
69·8	Weedon (69¾)	—	70 01	69 33	72 22	72 18	72 01	74 10
			p.w.s.					
75·3	Welton (75¼)	—	76 29	74 58	77 38	77 21	77 06	79 40
							sigs.	
82·5	RUGBY (82½)	85	84 18	82 18	84 23	84 35	86 05	86 45
83·3	*Rugby No.* 7 (83¼) ..	—	85 11	83 09	84 14	85 22	87 31	87 40
89·0	Brandon (89)	—	90 57	88 53	90 45	90 42	93 17	93 20
				sigs.			p.w.s.	
94·0	COVENTRY (94) ..	97	96 21	94 37	96 05	95 42	98 57	98 15
94·0	Net times (minutes) ..	97	94¾	94¼	96	94½	95	98¼

to which they are adapted could have no better illustration than is afforded by the series of runs about to be described, partly made on 97-minute timings over the 94 miles from Euston to Coventry, and partly on the 109-minute bookings over the 107.5 miles in each direction between Willesden and Birmingham. For the whole of the runs tabulated and described I am indebted to correspondents.

We will begin with the Euston-Coventry runs. These were, in all cases but the third, unassisted in rear up Camden bank, which is equivalent to a handicap of at least a minute as compared with banked runs. The regular traveller who sent me these runs invariably times to mile-posts, and I therefore reproduce the table in exactly the form in which he sent it to me. It is necessary to mention this point, as in the other table the usual centre-of-station distances are employed.

The first run had the lightest load of the series, but was made in very bad weather, with a strong cross-wind from the south-west. Notwithstanding this, No. 1171 succeeded in maintaining a minimum speed of 56 m.p.h. up the 1 in 335 to Tring, and 58 up to Roade Summit, as well as making the fastest time of the five from Tring to Bletchley, so that "even time" was all but attained at Weedon. After this a bad p.w. check was experienced, but Rugby was passed in 84¼ min., and Coventry reached, without further hard running, ¾-min. early. On the second run No. 1056 was responsible for some remarkable climbing to Tring, with a 265-ton load, speed being maintained at an average fractionally over 60 m.p.h. between mile-posts 10 and 14½, and at precisely 60 m.p.h. from Boxmoor up to the summit at mile-post 31. The actual minimum rate was 58 m.p.h. To run the 26⅛ miles from Willesden up to Tring

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in 25 min. 12 sec. was no mean achievement. "Even time" was reached on this run at Castlethorpe, but the engine was eased up to Roade Summit. Nevertheless, the "even time" was regained by Weedon, and thereafter the engine ran within it until the slack before Coventry, passing Rugby in the remarkable time of 82 min. 18 sec. from Euston. Despite a concluding signal check Coventry was reached 2½ min. early.

The third run, with the same engine and load, represents an average unchecked journey with no features of special note. At the three modest "summits" of Tring, Roade and Kilsby Tunnel the minima were 52, 53½ and 55 m.p.h., and a minute was gained to Coventry. In its initial stages, as far as the bridge repairing slack at Berkhamsted, the fourth run was but a moderate effort; after that, however, the running livened up considerably, especially between Bletchley and the 93rd milepost, a distance of 46⅜ miles run in 42½ min., including Rugby slack. The minimum speeds were 58½ m.p.h. at Roade and 59 at Kilsby Tunnel. So Coventry was reached in 1¼ min. under schedule, despite the slow start and the check.

Perhaps the most notable effort in the table is that of No. 1053 with a ten-coach train, which appears in the 5th column. A p.w.r. check was experienced at West Hampstead, but there was again some extremely fine uphill running, such times as 4 min. 35 sec. for the 4½ miles between mile-posts 10 and 14½, up 1 in 339, or 7 min. 8 sec. for the 7 miles from "21" to "28," representing the merest shade under 60 m.p.h., in running this 300-ton train up a continuous 1 in 330. Actually the minimum rate at Tring was 55 m.p.h., and the 26⅛ miles from Willesden up to this point were run in 26 min. 40 sec. The running from Tring onwards did not include any very high downhill speeds, but the minimum at Roade was 57 m.p.h. and at Kilsby Tunnel 59 an hour. Signals were badly on before and through Rugby, and with the early p.w. delay and a further signal check outside Coventry made the total time all but 99 min. But the net time was nothing more than 95 min., if as much as this. This was a really excellent performance. No maximum speeds were included in the foregoing logs, and I am therefore unable to give any figures in regard to these.

On yet another run, which I have not included in the table owing to the fact that the recorder took the usual times to points at the centre of stations, No. 1164 had an even heavier 42-axle train of 301 tons empty, or 320 tons all told. Willesden was passed in 11¼ min., Watford in 24 min. 5 sec., Tring in 39 min. 13 sec., Bletchley in 52 min. 20 sec., Roade in 65 min., Weedon in 74 min. 10 sec., Rugby in 86 min. 45 sec., and Coventry was reached in 98 min. 15 sec.—a loss of 1¼ min. on schedule. This performance, though by no means a bad one, in view of the load, falls short of that just described behind No. 1053, which was hauling only 20 tons less of train.

I have now a second series of runs, timed by a third correspondent, in which there figures the 9.10 a.m. down express, calling at Willesden but not at Coventry. Compounds are again concerned throughout, with lighter loads on most of the trips, but in one case a total of 300 tons was carried, equalling the maximum of the previous series. On the first run in this table No. 1167 made a fair start, attaining 53-54 m.p.h. up the rise past Harrow, touching 64 at Watford, and keeping up 55½ m.p.h. to Tring Summit; from there to Wolverton speed fluctuated between 65 and 69 m.p.h., save for a brief rise to 70½ through Bletchley. The ascent to Roade was breasted at 56½ m.p.h., and speed had risen to the unusual figure of 69½ beyond Blisworth, when there came a signal check at Heyford. After this speeds were 55 an hour at Kilsby Tunnel, 68 before Rugby, a higher than usual rate through Rugby, 68 at Brandon, and, after the p.w. check, 53 on the 1 in 330 past Tile Hill, and 70½ at Hampton. Time was just kept, checks notwithstanding, and the net time was 104¼ min.

No. 1168 got away more smartly, passing Hatch End at 59 m.p.h., Watford at 64, and maintaining but a shade under 60 an hour up to Tring, after which speed reached 72½ m.p.h. before the p.w. check near Leighton. But there was a fine subsequent acceleration to 75 m.p.h. at Wolverton and a minimum of 60 at

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Roade, when there came two further checks, this time from adverse signals. Nothing daunted, the driver worked up to 64 m.p.h. at Weedon and went up to Kilsby at a minimum rate at 62 m.p.h. Down to Rugby, where a careful slack was made, the maximum was 69 m.p.h., followed by 70½ at Brandon, and finally, after the Coventry p.w.r. check, 75 m.p.h. at Hampton. Despite four separate checks, the driver effected his arrival at New Street only ½ min. behind time, and the net time did not exceed 103¼ min. for the 107.5 miles—a very fine achievement.

The third run was distinguished by a brilliant start to Watford, where the train had attained 69 m.p.h. when a slight signal check was experienced, to 52 m.p.h. From this No. 1169 recovered to 60 m.p.h. by Boxmoor, but fell to 58½ above Berkhamsted. Then came maxima of 75 m.p.h. at Cheddington and 72 at Wolverton, with rather easier running in between, minima of 54 m.p.h. at Roade and 56½ at Welton, and maxima of 68 before Rugby, 70½ at Brandon, and 75 at Hampton, with an intervening minimum of 60 at Beechwood Tunnel. The arrival at New Street was 2 min. early,

L.M.S. WILLESDEN—BIRMINGHAM.

Distance.	Engine 4-4-0, No. Load (tons tare) ,, (,, full)	Schedule.	9.21 a.m. Down.					4.50 p.m. Up.				
			1167 220 235	1168 221 235	1169 221 235	1162 226 240	1170 285 300	Distance.	Schedule.	1056 189 200	1051 215 225	1056 267 285
Miles.		min.	m. s.	m. s.	m. s.	m. s.	m. s.	miles.	min.	m. s.	m. s.	m. s.
0·0	WILLESDEN JUNC. ..	0	0 00	0 00	0 00	0 00	0 00	107·5	109	106 50	105 30	113 10
2·7	Wembley ..	—	4 30	4 20	4 15	4 50	4 45	104·8	—	103 35	102 45	110 30
6·0	Harrow ..	—	8 20	7 55	7 50	8 45	8 30	101·5	—	100 25	99 35	107 50
7·9	Hatch End ..	—	10 30	9 55	9 50	11 00	10 40	99·6	—	98 35	97 45	106 10
12·0	WATFORD ..	14	14 45	14 00	13 45	15 30	15 00	95·5	97	94 20	93 40	102 25
					sigs.							
15·5	King's Langley	—	18 05	17 20	17 30	19 00	18 30	92·0	—	91 05	90 25	99 25
19·1	Boxmoor ..	—	21 35	20 40	21 05	22 35	22 05	88·4	—	87 55	87 20	96 35
22·6	Berkhamsted ..	—	25 10	24 05	24 35	26 00	25 45	84·9	—	84 50	84 15	93 35
26·3	TRING ..	29	29 10	27 55	28 30	29 40	29 45	81·2	83	81 15	80 25	89 45
												sigs.
30·7	Cheddington ..	—	33 10	31 45	32 25	33 20	33 45	76·8	—	76 35	75 25	82 00
				p.w.s.								
34·8	Leighton ..	—	36 55	37 30	35 50	36 30	37 10	72·7	—	72 30	71 15	77 55
41·3	BLETCHLEY	43	42 40	43 35	41 45	41 50	42 45	66·2	67	66 10	64 50	71 00
												sigs.
47·0	Wolverton ..	—	47 45	48 05	46 45	46 40	47 50	60·5	—	60 50	59 20	65 15
											sigs.	
54·5	ROADE ..	55	54 55	55 00	54 20	53 45	55 20	53·0	54	54 25	51 45	58 30
				sigs.								sigs.
57·4	BLISWORTH	58	57 45	59 00	57 25	56 40	58 25	50·1	51	51 40	49 05	stop.
			sigs.	sigs.								
64·3	Weedon ..	—	65 10	66 50	64 15	62 50	64 45	43·2	—	45 40	43 15	43 00
69·9	Welton ..	—	72 00	72 00	69 55	67 55	70 05	37·6	—	40 55	38 25	38 05
77·2	RUGBY ..	77	78 55	78 40	77 00	74 35	77 20	30·3	31	32 40	30 25	29 45
77·8	*Rugby No. 7* ..	—	79 40	79 55	78 20	75 25	78 10	29·7	—	31 20	29 30	28 40
83·7	Brandon ..	—	85 15	85 45	84 00	81 05	83 50	23·8	—	25 05	23 35	23 15
			p.w.s.	p.w.s.		p.w.s.				p.w.s.		
88·6	COVENTRY ..	88	90 15	90 53	88 20	86 45	88 10	18·9	19	19 10	19 25	19 15
92·1	Tile Hill ..	—	94 20	94 55	92 00	91 15	91 40	15·4	—	16 05	16 00	16 10
97·4	Hampton ..	—	99 20	99 45	96 45	96 40	96 35	10·1	—	11 05	11 00	11 00
101·0	Marston Green	—	102 20	102 40	99 50	99 55	99 40	6·5	—	8 00	7 45	7 55
							sigs.					
103·7	STECHFORD	—	104 40	105 00	102 20	102 30	103 00	3·8	—	5 30	5 15	5 25
105·6	Adderley Park	—	106 25	106 45	104 15	104 15	106 05	1·9	—	3 25	3 10	3 30
107·5	BIRMINGHAM	109	108 45	109 30	107 05	106 45	108 55	0·0	0	0 00	0 00	0 00
107·5	Net times (min.)	109	104¼	103¼	106½	104½	106½	107·5	109	104¾	104	102½

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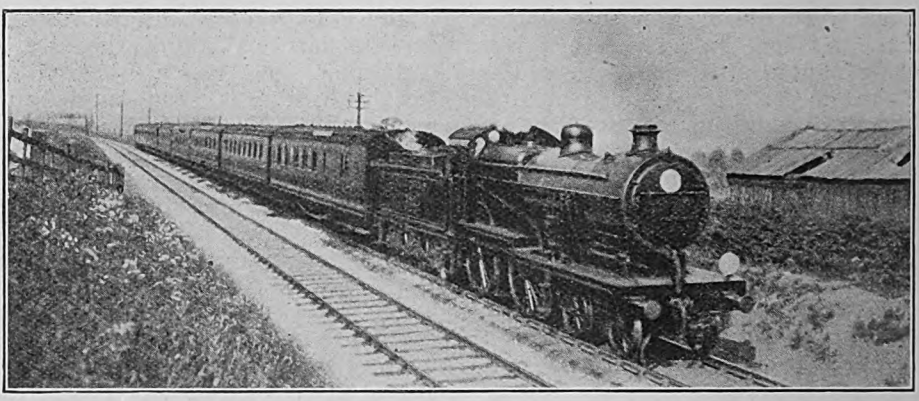

Photo.] [*E. A. Gurney-Smith.*

UP KENT COAST PULLMAN EXPRESS NEAR ROCHESTER.

S.R. 4-4-0 No. A736.

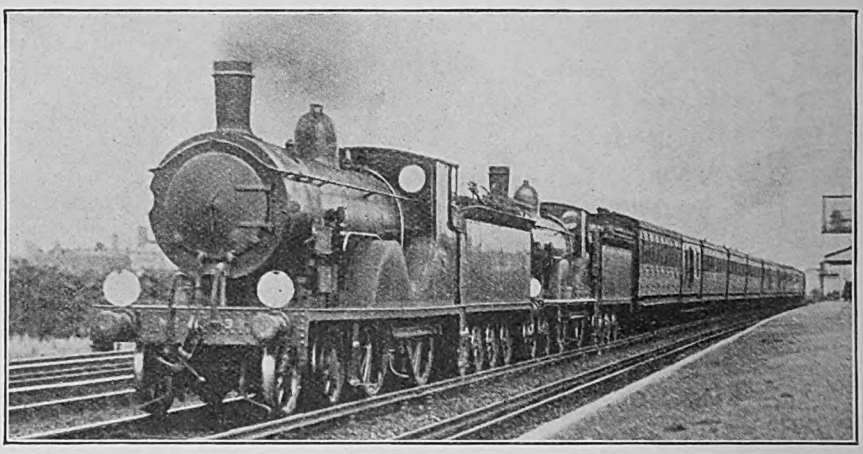

Photo.] **DOWN PORTSMOUTH EXPRESS VIA WOKING.** [*F. R. Hebron.*

S.R. 4-4-0's Nos. E337 and E717.

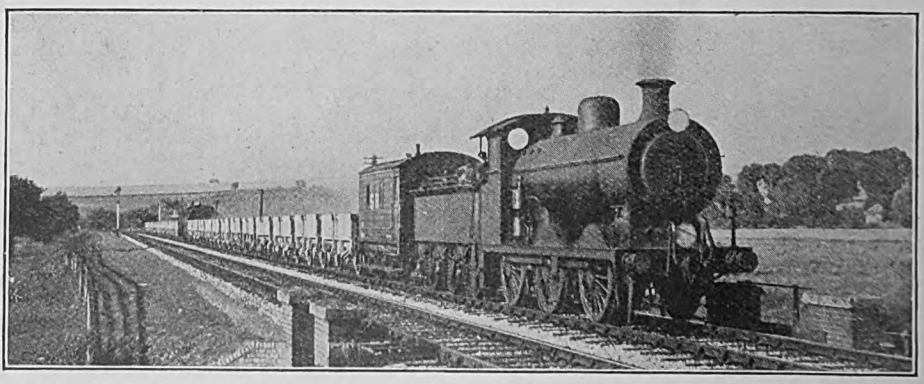

Photo.] **DOWN BALLAST TRAIN NEAR ARUNDEL.** [*H. Gordon-Tidey.*

S.R. 0-6-0 No. B440.

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the actual time being thus just under "even" from start to stop, and the net time 106½ min.

On the fourth run No. 1162 started in leisurely fashion to Watford, but then appeared to wake up, maintaining 60 m.p.h. steadily all the way up the 1 in 335 to Tring, and 75 to 76½ from Cheddington to Leighton, so that by Wolverton "even time" had been bettered from the start. A minimum of 56½ an hour at Roade, a maximum of 68 before Weedon and a minimum of 62 at Kilsby then took the train through Rugby in 75 min. 25 sec. from Willesden. After that the easiest of running sufficed for timekeeping, and despite the same p.w. check as previously through Coventry, Birmingham was reached in 106¾ min., 2¼ min. early, or in 104½ min. net.

On the last of the five runs a fine effort was made, without any spectacular features; speeds were 54 m.p.h. past Hatch End, 63 at Watford, 54 up to Tring, 72 at Cheddington, 69 at Bletchley, 68 at Wolverton, 54 at Roade, 64 at Weedon, 57 at Kilsby, 65 at Hillmorton, 68 at Brandon, 60 at Beechwood Tunnel, and 69½ at Hampden, after which a bad signal check was suffered at Stechford. Nevertheless No. 1170 just scraped in to time; and the net time for the journey was not more than 106½ min. On every one of these five runs, therefore, after due allowance has been made for delays, the net time works out at something better than "even," with loads ranging from 235 to 300 tons behind the tender.

The corresponding up journey is a minute or two easier in character than the down, the smart descent from the start at New Street being of particular help in getting away. On the first of three journeys with the 4.50 p.m. from New Street, No. 1056 had an easy task with 200 tons (a 26-axle train), attaining 70½ m.p.h. at Hampton and before Coventry and not falling below 64 at Beechwood Tunnel. Then came the Coventry and Rugby checks. After that speeds were 74 m.p.h. at Weedon, 63 at Roade, 73 at Castlethorpe, 62 at Bletchley, 60½ at Leighton, 60 at Cheddington and 56 at Tring, after which a very easy descent, with no higher speed than 69½ m.p.h., sufficed to gain 2¼ min. to Willesden. Net time was 104 min. A 3-min. stop at Willesden and a start-to-stop run of 9 min. 35 sec. from there to Euston made up a total of just under 119½ min. gross time from Birmingham to London.

The second of the up runs had a p.w. check immediately after starting, but No. 1051 worked up to 60 m.p.h. by Stechford, and the following speeds were 70½ at Hampton, 58 at Beechwood, 71½ at Coventry, 40 through Rugby, accelerating to 57 up the 1 in 370 to Kilsby Tunnel, 75 at Weedon and 61½ at Roade, after which came signal checks at Castlethorpe and Bletchley, neither of them severe. By Leighton the train was again travelling at a mile a minute, and although the speed fell to 50 an hour at Tring, a moderate descent, with no higher speeds than 72½ m.p.h. at King's Langley and 70½ at Wembley, sufficed for a gain of 3½ min. in gross time. Net time was about 104 min.

The third up run might have been the best of the series, had it not suffered so terribly by signal checks. Despite a train but little short of 300 tons in weight, No. 1056 worked up to 69 m.p.h. at Hampton, breasted Beechwood at 60 and passed Coventry at 76½ an hour, maintaining 70½ to the Rugby slack. Weedon was passed at 72½ m.p.h., but between there and Roade there were two dead stops at adverse signals. Then, after 73½ m.p.h. had been reached at Castlethorpe troughs, came a signal check to 50 through Bletchley; recovering from this to 62 at Leighton and no less than 63½ at Cheddington—despite the unbroken adversity of the grading—No. 1056 was brought down to a walking pace for signals in Tring Cutting. There must, however, have been a rare sportsman on the footplate, as, after getting through Tring, he worked up to 75 an hour through Boxmoor and King's Langley, and again, after an intermission to 64 at Bushey troughs, to 73 through Wembley, so making Willesden in 113 min. 10 sec. Two dead stands for signals, a slack to walking pace and two slighter checks had thus together only occasioned a loss of 4 min. 10 sec. on the fastest of all L.M.S. schedules, and the correspondent who forwarded this run makes no extravagant claim in giving a net figure of 101¾ min. for the journey.

It is the more pleasure to me to be

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able to publish a series of Midland compound runs of this character after having "backed" the engines to the extent that I did when they were first introduced on this service. From these runs it would seem clear that the compounds can readily keep time on the fastest Birmingham trains with loads up to 250 tons tare, or with up to nine 8-wheelers, but that at 300 tare tons little or no margin is left in hand to meet possible delays *en route,* save when the driving is of an exceptionally competent character. The position on the Midland Division is almost identical with this. The last seven runs that I have timed in detail over the Midland route south of Leicester had trains of 275, 276, 280, 246, 273, 271 and 271 tare tons respectively, and gross loads of 290, 290, 290 (there were three empty coaches in this formation), 265, 285, 285 and 285 tons. On the first (8.25 a.m. from St. Pancras), we kept exact time to Luton, lost 45 sec. to Kettering, 1 min. 40 sec. to Market Harborough, and 20 sec. (including a p.w.r. check just after Market Harborough) to Leicester. On the second (10.25 a.m.), the bad bridge slowing after Market Harborough was the only check, and we arrived 2¾ min. late. On the third (6.45 p.m. from Nottingham to London), we ran well, and were a minute early through St. Albans, but concluding signal checks made us 2 min. late into St. Pancras. The fourth (10.25 a.m. down) had one p.w.r. check, at Chiltern Green, with plenty of distance for subsequent recovery, but we were 2¾ min. late at Leicester. On the fifth, after a somewhat poor start from St. Pancras on the 10.25, the engine seemed to be going well throughout, but for most of the distance we were a little behind time, and just contrived to reach Leicester on the stroke of 12.14 p.m. On the sixth run we were nearly 2 min. down at Bedford, but by fine running after that contrived to reach Leicester ½ min. early. From the general running I should regard it as doubtful if time would have been kept on either of the last two runs had we experienced any signal or p.w. delays, and this view was confirmed on the seventh run, when a couple of p.w.r. checks *en route* made us 3½ min. late at Leicester—on the 110-min. booking of the 12.25 p.m. express.

Thus, even on the Midland Division, on slower than pre-war schedules, the Midland compounds do *not* appear to have much in reserve in these fast bookings with loads greatly in excess of 250 tare tons. On my last southbound trip from Carlisle, again, our compound took a pilot to Ais Gill with but 285 tare tons, whence the pilot returned "light" to Carlisle. Piloting is certainly rare now on Midland Division passenger trains south of Leeds, but an enormous amount of freight-train piloting still goes on. In Scotland the compounds are now limited to 250 tare tons from Glasgow to Kilmarnock, 310 tons thence to Dumfries and 300 tons from Dumfries back to Glasgow, and piloting on certain trains, such as the southbound 9.20 a.m. from Glasgow as far as Kilmarnock, is very frequent. Up Beattock bank 230 tons is the maximum unpiloted load permitted to a compound from a standing start, and 260 tons from a flying start, though the compounds are allowed to take 400 tons in the opposite direction from Carstairs or Symington to Carlisle. Even the "Royal Scots" are now restricted to 335 tons maximum tare from a stop at Beattock over Summit, and 375 tons from a flying start, as also to 420 tons maximum over Shap from the South—a substantial drop from the 500 tons which at the time of their construction was announced as their rostered load over both summits.

The significance of the figures just given is that any excess over them calls for pilot or banking assistance, and it will be agreed that, in the days in which we live, most of the maximum loads quoted represent but moderate trains. The Midland 4-4-0 compounds are, on published test figures, the most efficient locomotives on eight wheels ever yet built in this country, and I yield to no student of locomotive performance in admiration for the remarkable feats that they perform, such as those set out in this article, and especially in relation to coal consumption. But there is obviously a limit to their tractive capacity—as, indeed, is proved by the foregoing figures—and on the Scottish services in particular, with the formidable grades over which they have to be operated, it is hard to avoid the conclusion that a 4-6-0 design

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of ample power is called for. Cases could certainly be cited on other British railways where the time-table and load demands are such as to leave little margin against possible delays to the engines customarily working them—the "Directors" on the hardest Great Central Section trains of the London and North Eastern Railway (whose punctuality is largely due to the exemplary absence of signal checks which nearly always characterises their journeys), for example, or the Southern enlarged "L" class 4-4-0's on the Folkestone 80-minute trains, or even (tell it not in Gath!) Great Western "Stars" on such heavy 2-hour Birmingham trains as the 2.10 p.m. down, which is a bad timekeeper. But it cannot be disputed that the "big engine" policy pursued steadily during the past decade by the other three groups has given them a greater average tractive power per locomotive, and a greater margin per locomotive against the enhanced demands of the future, than exists at present on the London Midland and Scottish. It would be deeply interesting if some authority, with complete access to all the relevant figures, could prove definitely and finally which is the correct policy of the two. Acknowledgment is due, in conclusion, to J. D. Thomson, P. Eleoat, C. L. Jamblin, W. Robertson, Thos. Adkins, A. D. Pordige, F. A. Plant, W. R. Coleby, A. Mastelloni, M. M. Niven, G. E. H. Roberts-Hay-Boyd, R. P. Ellis, D. B. Hart, R. Tabb, F. Pickering, A. W. Smith, H. Dixon Hewitt, J. E. T. Phillips, R. H. Dale, D. F. Thom (New York), J. M. R., and "Coisde Teineadh" for correspondence received during the past month.

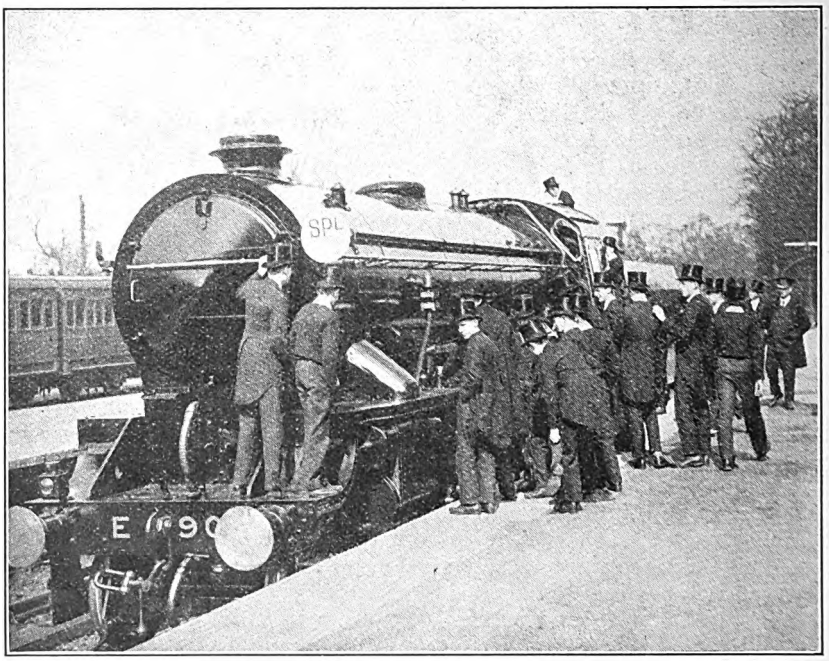

Photo.] [*Planet News.*

BOYS FROM ETON COLLEGE INSPECTING THE NEW SOUTHERN RAILWAY 4-4-0 TYPE LOCOMOTIVE AT WINDSOR. (*See page* 359.)

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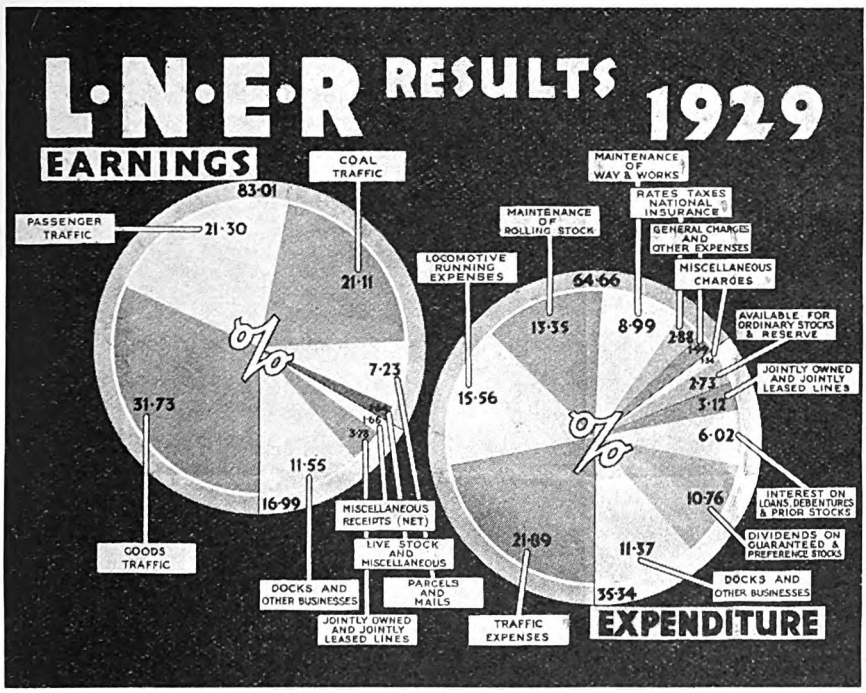
A Novel British Railway Poster.

In last month's issue brief reference was made to a new poster, of a somewhat unusual kind, giving in percentage form the accounts of the London & North Eastern Railway Company for the year 1929. Special interest attaches to the fact that this is the first time a poster summary of the big British railway companies has been issued to the public. The poster, which is reproduced herewith, is very attractively coloured, red, blue, and yellow inks being used with excellent effect on a black background edged with white. Naturally, much of this effect is lost in a small black-and-white reproduction such as that shown on this page, though the interest, of course, remains. As will be seen, the annual results are shown within two (coloured) circles, standing for "earnings" and "expenditure" respectively.

The poster shows, amongst other items, that the interest on debentures and the dividends on the guaranteed stocks are no less than 16.78 per cent. of the expenditure of the company. These dividends, of course, have always been paid, and there is this year, in addition, an amount equal to 2.73 per cent. available for reserve and the payment of dividend on the ordinary stock. This amount is less than the figure required to pay rates, taxes and National Insurance, which occupies 2.88 per cent. of the circle.



The "Earnings" circle is divided into the following segments:—

	Per cent.
Goods traffic	31·73
Passenger traffic	21·30
Coal traffic	21·11
Docks and other businesses	11·55
Parcels and mails	7·23
Jointly-owned and jointly-leased lines	3·78
Miscellaneous receipts (net)	1·66
Live stock and miscellaneous	1·64

while the "Expenditure" circle shows:

Traffic expenses	21·89
Locomotive running expenses	15·56
Maintenance of rolling-stock	13·35
Maintenance of ways and works	8·99
Rates, taxes and national insurance	2·88
General charges	1·99
Miscellaneous charges	1·34
Jointly-owned and leased lines	3·12
Docks and other businesses	11·37
Interest on loans, debentures and prior stocks	6·02
Dividends on guaranteed and preference stocks	10·76
Available for ordinary stocks and reserve	2·73

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Railway Electrification in Italy [II.]

By THEODORE RICH.

FOR operating electrified sections of the State Railways locomotives are almost exclusively used; including those on order, there will be shortly over 700 in operation, a number that is not much less than that of those in operation in the rest of Europe combined. For the handling of heavy goods and general traffic in the Genoa-Turin area a number of locomotives of a modified Giovi type have been set to work; they weigh 75 tons and have two motors, each of 1,250 horsepower. A feature of this type of locomotive, as with others of the three-phase type on the State Railways, is that the starting resistances are of the liquid type, in riveted tanks with fixed plate electrodes which make contact with the liquid; this system was originally introduced by Messrs. Ganz on the Valtellina line. The tank is divided vertically into two parts by a diaphragm, the electrodes being in the upper part. When starting, compressed air is admitted above the liquid in the lower compartment; the liquid is blown into the upper part into contact with the electrodes, the surface of contact being increased as the liquid rises; when up to the top the electrodes are short-circuited and the air released, and the liquid falls again into the lower part of the tank. For speed variation the induction motors are placed in concatenation, that is to say, in series through the rotors, and then in parallel, giving speeds of 15½ and 31 miles per hour respectively. There are nearly two hundred locomotives of the Giovi type and about the same of the modified type in operation.

For fast passenger traffic the locomotives are of two general types, six-coupled and eight-coupled. Of the former there are two groups, each 2-6-2, and with two three-phase motors, one type with motors of 1,250 h.p. each, four speeds and a maximum speed of 62 miles an hour, the latter with two motors, each 1,000 h.p., with a maximum speed of 46 miles an hour; both types weigh 72 tons. The eight-coupled locomotives have motors of 1,250 h.p. and maximum speeds of 62 miles per hour. They weigh 90 tons and have 16 tons on each driving axle. On many sections of line, owing to the gradients and repeated curves, it is not possible to run high speeds, but on the recently electrified section from Spezia to Leghorn long stretches of comparatively straight track exist, over which it is possible to take full advantage of the 62-miles-per-hour speed of many of the new passenger locomotives. For the recently electrified cross-country line, Rome to Sulmona, a series of locomotives has been delivered of the 2-8-2 type, for operating on 45 periods with 10,000 volts; some of these have been made by the Italian Brown Boveri Company and some by Ernesto Breda, of Milan; some of these have been designed with three speeds, with a maximum of 46 miles per hour, the rest with four speeds with a maximum of 62 miles per hour.

A three-speed type made by Ernesto Breda has a total fixed wheelbase of 21 feet, with a side play of 0.78 inches on the axle boxes; the drivers are 4 ft. 5½ in. diameter; the motors are geared down from 1 to 2.25. The weight is 94 tons. The contact line voltage of 10,000 is reduced by a transformer to 1,850 volts when the motors are operated in cascade, to 1,600 volts when operated at top speed in parallel. By modification of certain connections the locomotives can be operated at 3,600 volts with 16 periods.

A number of direct current heavy locomotives have been made for the Foggia-Benavento line; these have the motors geared on to each driving axle. Regarding the three-phase locomotives, it can be said that these have proved very satisfactory in service; they are very robust in construction; some of them do 74,000 miles per year. As compared with many electric locomotives, the control apparatus is remarkably simple; the double overhead contact bows give practically no trouble, and a visit paid to a busy locomotive depôt at Bussoleno

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would tend to show that, despite the fact that the motors are wound for 3,600-4,000 volts, the repairs to windings are few and far between. As compared with steam traction and with electric traction on some lines, the way in which heavy passenger trains run down very steep grades at 32 miles per hour with perfect control is a revelation of what can be done with three-phase traction.

One objection which has been urged against the three-phase system of traction is the fact that two overhead conductors are necessary ; at first sight this difficulty would seem almost insolvable at junctions. The first designs used required wood insulating distance pieces, but now, by means of a short length of dummy conductor, which serves first for one phase and then for the other as a guide to the contact bows, it has been found possible to bridge over such gaps in the aerial conductor as are necessary at points, the forward contact bow re-making contact before the rear bow enters a gap. The collection is so good that in the dark, owing to the absence of sparking, it is difficult to tell when junctions are being passed through. At certain points, where there are little used cross-over roads and sidings, junctions are not arranged for the overhead conductors ; the trolley bow is lowered at such places by letting out the air from behind the pistons which keep the arms up and the bows in contact. Each locomotive has contact arms fore and aft, with two contact bows, placed side by side, insulated from the frame and from one another. At first sight, with 4,000 volts, one would anticipate many short circuits between the arms, but in practice no material difficulty is experienced.

At first two wires in parallel were used for each phase overhead, these conductors being supported like tramway trolley wires by cross-suspension at short intervals ; in the high-speed sections near Leghorn a single contact conductor has been used for each phase suspended on the catenary (suspension bridge) system, with much longer spans between the supporting posts ; with this latest arrangement any troubles due to broken suspension insulators will, through the elasticity of the arrangement, be reduced to an absolute minimum. At station sidings single conductors are used generally, supported on long double or single brackets, which sometimes overhang four tracks.

In most cases 60,000-volt aerial feeder lines run alongside the track, extra heavy, extra tall supports being provided every third track conductor span to carry them ; tapping is made to these lines to static transformer sub-stations, where the pressure is reduced to that of the line. The posts are either of weldless steel of a circular section or of an oval section with welded up walls. Apart from the fact that the semaphore arms are deeper and not quite so long, many of the signals in Italy resemble those at home ; the distant signals are painted yellow, like those on the District Railway, the arms being also fishtailed. On the newest sections, to draw the attention of the locomotive drivers, diagonal black and white stripes are placed on the posts near to the signals. The steel posts are painted grey.

Besides the State Railways, apart from city tramways, there are in operation nearly 600 miles of electrically operated line owned by private companies ; most of these lines are what are termed with us light railways ; there is a further 132 miles of such lines being constructed or equipped ; three-quarters of the mileage of the private lines is arranged for direct current, the remainder for single phase. One of the most important private lines is the Umbria Central, which operates from Terni to Umbertide, seventy miles of route, in a stretch of country about 80 miles to the north of Rome, in a historic and romantic neighbourhood around Perugia and Assissi. The current is supplied to the trains at 25 periods, single phase, 11,000 volts. The trains are hauled by autocars, the passenger trains having a weight of about 140 tons, the goods trains about 200 tons ; the overhead conductor is suspended on the catenary system ; each autocar has four 80-h.p. motors, suspended on the four driving axles like tramway motors. Some of the private lines are of narrow gauge. A line has been constructed comparatively recently to handle traffic between Rome and Ostia, near the mouth of the Tiber, providing the people of the metropolis with means of getting to that newly developed bathing place and holiday resort. Near Ostia is to be seen the ruins of an

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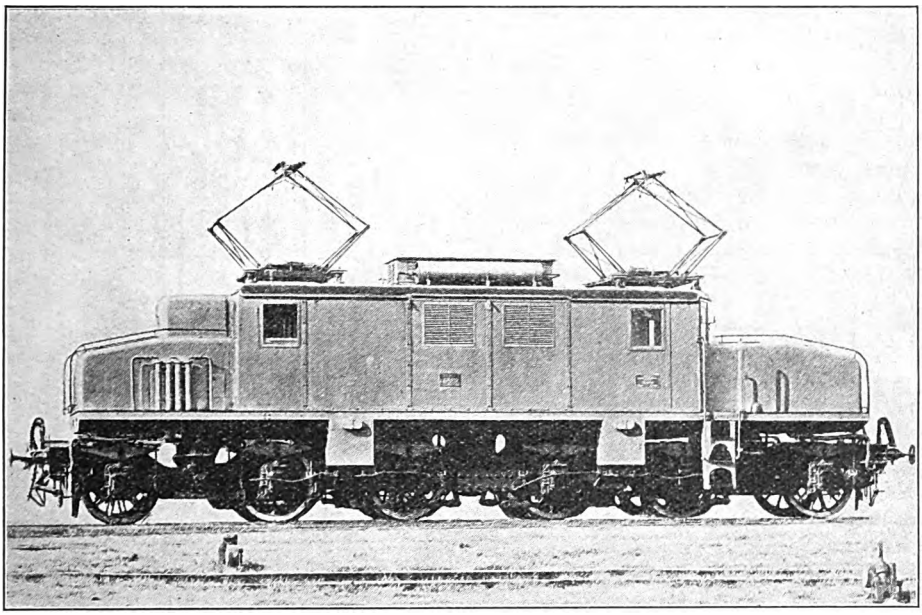
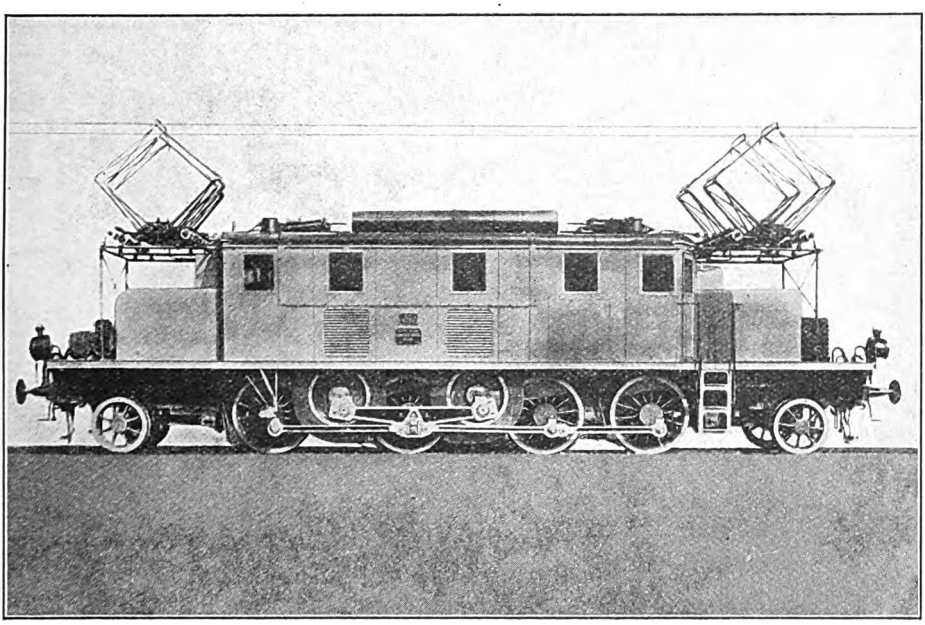


TYPE E.625] ELECTRIC LOCOMOTIVE FOR CONTINUOUS CURRENT AT 3,000 VOLTS, FOGGIA RAILWAY.



TYPE E.472 ELECTRIC LOCOMOTIVE. THREE-PHASE, 10,000 VOLTS, 45 PERIODS, ROME-SALMONA LINE.

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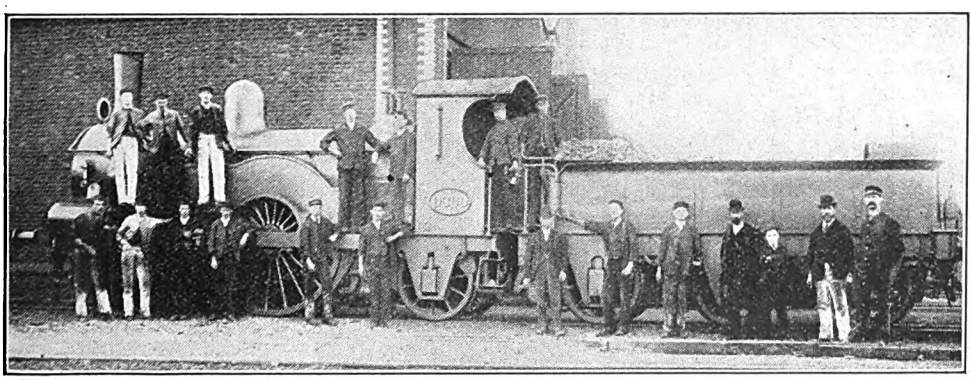
old Roman city, which used to be a port and warehousing point in old days. The line is 16 miles long ; it is equipped on the high-tension direct-current system ; the trains operate at high speed ; it is probable that before long a commercial port will be developed at Ostia to supply Rome.

General.

The Italians were the first people to handle heavy passenger and goods traffic over congested steep grade main line sections by means of electric traction ; they have been pioneers, and as such have had to buy a good deal of their experience ; many technical improvements have been made in their apparatus and methods, and much of their electrical, mechanical and civil engineering is very fine as befitting the nation that gave Leonardo da Vinci and Volta to the world. One of the most beautiful districts now served by electrified lines is that between Genoa and Sestri-Levanti, on the Eastern Italian Riviera. There is a succession of garden towns, such as Rapallo and Santa Margerita, in gaps in the mountains, looking seaward, with sub-tropical vegetations and many social amenities ; this district is getting into favour as a winter resort. At one time, not so long ago, travelling in Italy was a byeword for unpunctuality, packed trains, general untidiness, and for dangers to luggage ; the streets of the cities visited were unkempt and swarming with beggars. Although a great deal of progress in electric traction dates from before the war, yet, thanks to the precept and practice of Signor Mussolini and his followers, whose methods are so often abused by those who have never seen the results, the improvements in Italian travel and in general civic life have been extraordinary ; Italy is no longer a land of the past ; it has leaped into prominence ; at the present it shows great energy and gives great promises for the future. British people need no longer hesitate about going to Italy as tourists ; they will find nowadays comfortable, punctual trains and courteous railway servants, and, with the memory of the comradeship of nations during the Great War, they will be well received wherever they go.

The writer must thank Senor Jacobini, the Chief Electrical Engineer, and the Administration of the Italian State Railways in Rome, and the District Engineers of Leghorn, Genoa and Turin for their assistance and hospitality during a visit to Italy in connection with the preparation of this article.

AN OLD "SINCLAIR" SINGLE, G.E.R.



ENGINE 0300, AT PARKESTON SHED ABOUT 1897.

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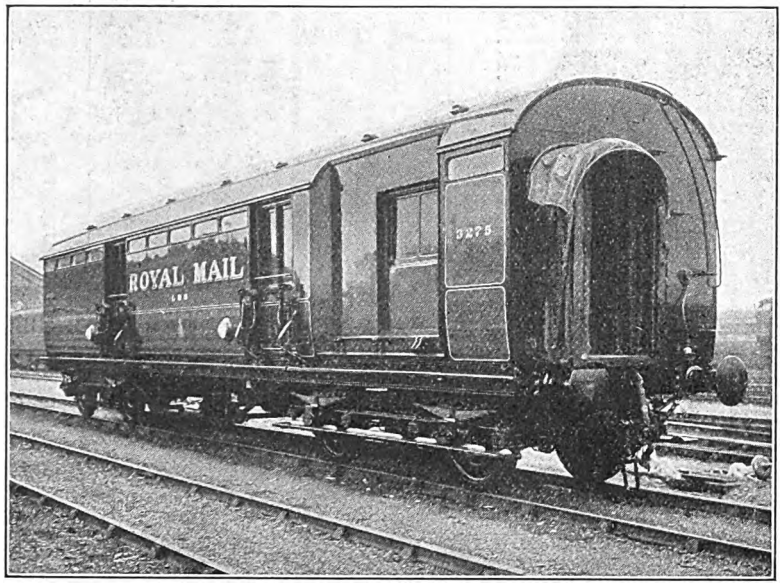
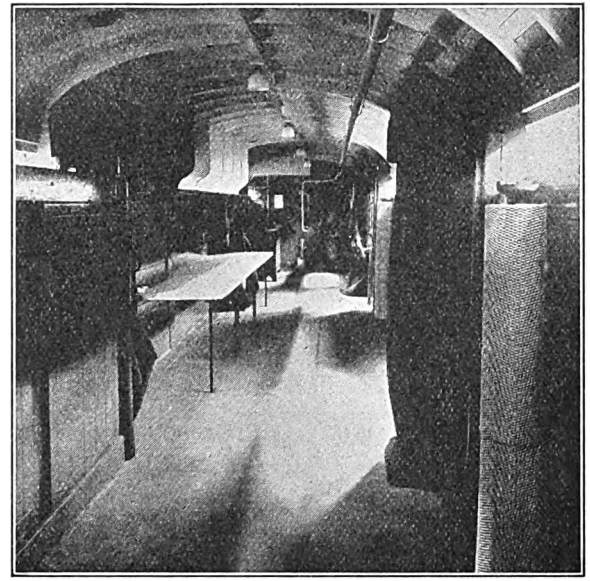
NEW POST OFFICE STOWAGE VANS, L.M.S.R.





Three Post Office stowage vans have been built at the Wolverton works of the London Midland and Scottish Railway Company. The vehicles are so constructed that, should the necessity arise, they can be converted with very little alteration for taking up and delivery of mails as a travelling post office. The underframes and bogies are of steel constructed to the company's standard designs, and are fitted with shock-absorbing buffers, vacuum automatic brake and steam heating, whilst the batteries and dynamo for lighting purposes are hung underneath. The bodies are of oak and teak framing (50 ft. 1 in. long by 8 ft. 6 in. wide by 8 ft. 4⅛ in. high), with steel-panelled sides and ends, sliding doors, net recess on near side and two sliding doors on the off side. The fittings comprise a wardrobe for clothes, folding tables for sorting purposes, a cupboard for storing crockery, &c., electric hot-water urn for making tea, and sink for washing up. Heating is carried out by means of Westinghouse vertical heaters and a 2-in. pipe carried along the roof of the carriage. The exterior is painted in L.M.S. standard colours with bold lettering "Royal Mail" on each side, while gangways of the standard pattern fitted to postal vehicles are provided.

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The Main Line Gradients of British Railways.

XVII.—GREAT WESTERN RAILWAY. PADDINGTON TO BRISTOL AND SOUTH WALES.

By "VOYAGEUR."

PADDINGTON TO BATH, BRISTOL AND TAUNTON (Sheets 5 and 6).

WE have now to deal with Brunel's original main line to the West, of which the first 36 miles, from Paddington to Reading, figured last month as the opening section of the more recent Westbury route. The stretch of line extending from Paddington to the 160th mile-post, composed in part of the original Great Western Railway, from London to Bristol, and in part of the old Bristol and Exeter Railway, is the most level railway of its length in the British Isles. Brunel certainly achieved this perfect grading at the expense of distance, so far as the West of England is concerned, but Swindon, Bath, Bristol and South Wales towns have every reason to be grateful to that famous engineer for so magnificent a legacy, which, coupled with present-day Great Western enterprise, has made possible the extremely high scheduled speeds by which these towns are now linked with London.

The only gradients really worth mention in this 160 miles are two short lengths at 1 in 100 down, the first (Dauntsey bank) for 1½ miles from the 86th mile-post, and the second for all but 2 miles through the Box Tunnel, followed by ⅝-mile at 1 in 120 nearly to Box Station. Half-a-mile up at 1 in 180 to Flax Bourton cutting, and a mile down at 1 in 200 past Flax Bourton Station, followed by ¼ at 146, complete a total of 5¾ miles out of 160 miles at an inclination of 1 in 200 or steeper! Save for the short intermission at 1 in 892-728 (2 miles) through Sonning Cutting, the ruling grade of 1 in 1,320 persists for the first 53½ miles from Paddington. Then follows a faint rise, chiefly at 1 in 754, 834 or 880, to Swindon, after which, apart from the 1 in 100 grades previously mentioned, the ruling grade steepens to 1 in 660, falling from the 80½ to the 91¾ mile-post, and rising thence to the Box Tunnel. Beyond Bathampton the 1 in 1,320 ruling grade reappears, and after a slight intermission from Bristol to 128¾ miles, where, in addition to the Flax Bourton Cutting inclines, there are approach grades of 7 miles at 1 in 334-440, the line continues practically dead level to Cogload Junction. Here the main West of England line, profiled last month, is rejoined.

Another record is created by the fact that over the 107 miles between Paddington and Bath there is not one single service speed restriction ; of no other 100-mile stretch of line in the British Isles could this be said. The Bristol avoiding line cuts 0.3 mile from the distances, as compared with passing through Temple Meads Station ; but it is subject to a severe speed restriction throughout. This route was used by the "Cornish Riviera Limited" express in the earliest days of its running, and by the non-stop trains from Paddington to Exeter, prior to the opening of the Westbury route. On Saturdays in summer certain trains from North to West—both from the Shrewsbury and Birmingham directions—are passed round the avoiding line, *via* Dr. Day's Bridge and North Somerset Junctions, to reduce the congestion through Temple Meads. Farther on, the Weston-super-Mare loop adds exactly one mile to the journey of those trains passing over it.

WOOTTON BASSETT TO CARDIFF, SWANSEA AND FISHGUARD (INCLUDING LONDON TO BRISTOL VIA *BADMINTON, BRISTOL TO PONTYPOOL ROAD AND SWANSEA AVOIDING LINES)* (Sheets 7, 8 and 12).

The opening of the 16 miles of line from North Somerset Junction, Bristol, to

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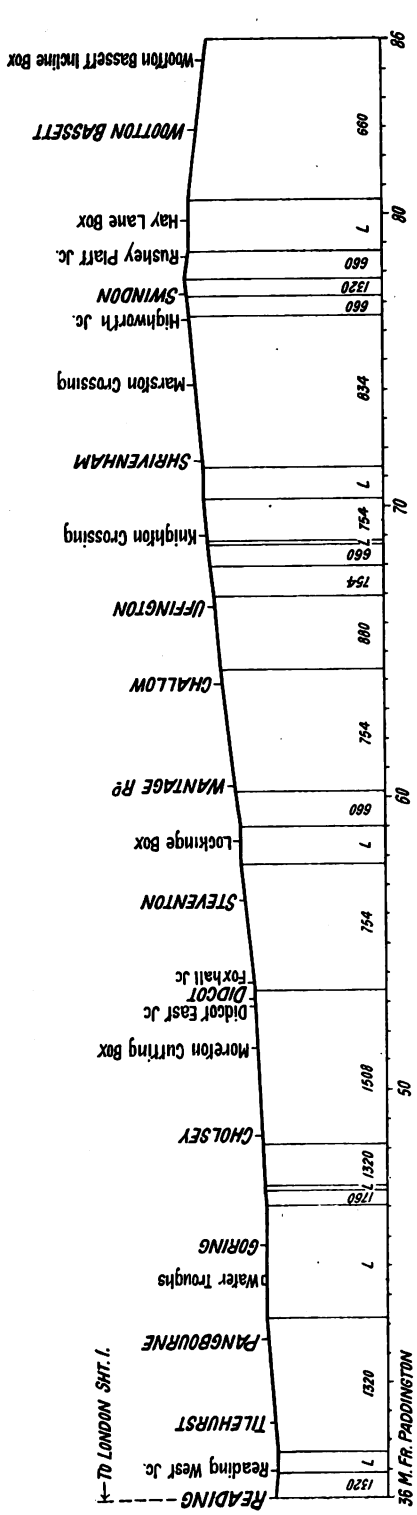
TO LONDON SHT. I.
READING
Reading West Jc.
TILEHURST
PANGBOURNE
Water Troughs
GORING
CHOLSEY
Moreton Cutting Box
Didcot East Jc
DIDCOT
Foxhall Jc
STEVENTON
Lockinge Box
WANTAGE Rd
CHALLOW
UFFINGTON
Knighton Crossing
SHRIVENHAM
Marston Crossing
Highworth Jc.
SWINDON
Rushey Platt Jc.
Hay Lane Box
WOOTTON BASSETT
Wootton Bassett Incline Box
36 M. FR. PADDINGTON
86
80
70
60
50
1320
1750
1320
1508
754
660
754
880
754
660
1320
1320
660
1320
660
834
660
1320
660
1320
660
1320

Severn Tunnel Junction, in 1886, cut 15.1 miles from the previous circuit *via* Gloucester; the Badminton cut-off, opened in 1903 from Wootton Bassett to Patchway, deducted a further 10.1 miles, as well as the slow running through Bath and Bristol, so that the present route from Paddington to South Wales is 25.2 miles shorter than that first in use. The short spur from Stoke Gifford to Filton Junction also provided a new route into Bristol, *via* Badminton, 0.7 mile shorter than the Bath route. But the gradients *via* Badminton, especially on the up journey—and both the two up Bristol 2-hour expresses follow the Badminton route—are a poor exchange for those through Bath, as they include the very steep Ashley Hill bank out of Bristol (2 miles at 1 in 75), and then the lengthy 1 in 300 stretches of the Badminton line, 11 miles of it up to Sodbury Tunnel, and 4¾ miles more at the same inclination up to Wootton Bassett. In the opposite direction there is a rise of nearly 9 miles at 1 in 300 to Badminton. It may be added that the gradients between Stoke Gifford and Bristol will appear next month with the Birmingham and Bristol route.

But it is the up express trains from South Wales which have the hardest task. The 11-mile rise to Sodbury Tunnel is preceded, in their case, by the terribly hard pull out of the centre of the Severn Tunnel, 7 miles in length, in which the only intermission in the 1 in 100 grade is the level ¾-mile through Pilning. It will be noticed that the down line—the original route—is steeper still, as it is partly inclined at 1 in 68, but a separate location has been found for the up line to ease the gradient to 1 in 100. Out of the tunnel, on the Welsh side, the line rises for 3 miles at 1 in 90. Inviting though the dip through the tunnel may appear on paper, also, drivers are discouraged from attempting to rush the ascents by high speed down the descents, and the 4.4 miles of the tunnel are seldom cleared in less than 5 min. It may be added that Severn Tunnel East Box almost adjoins the tunnel entrance; the West Box, however, is just ¼-mile above the west portal.

Beyond Severn Tunnel Junction the South Wales main line is practically level for 30 miles (save for the short inclines, which afford excellent starts from both Newport and Cardiff) to Miskin Crossing, 2½ miles beyond Peterston; it is again level for 25 miles from Gowerton, beyond Swansea, to Carmarthen; but between Miskin Crossing and Gowerton, and again from Carmarthen to Fishguard, there are some heavy gradients. The four pronounced summit points in the first-mentioned stretch are at Llanharan, Stormy Siding, Skewen and Cockett. To each of these summit points the grades become progressively steeper. To Llanharan a mile at 1 in 106 is the worst of the ascent from the east, followed by 3½ miles falling at 1 in 126-157; 2¾ miles at 132-163 to Stormy is succeeded by Pyle bank, 3¾ miles at 1 in 93-139; the service slowing through Neath is then the precursor of a 2¼-mile climb at 1 in 99-88, and a 2-mile drop at 1 in 91-106; and lastly, after Landore, there come two of the worst inclines of the whole route, rising at 1 in 52 for 1½ miles to, and 71 for ⅜-mile through Cockett Tunnel, and falling for 2½ miles thence, mostly at 1 in 50-53, to Gowerton.

The Swansea avoiding lines were devised to cut out these last-mentioned gradients, and also the congested lines round Neath and Landore, and to afford a shorter route to Fishguard, which at the time of their construction was expected to become an Atlantic port of considerable importance. The hope has not materialised, however, and, in consequence, the final stage of the cut-off route, which would have regained the main line near Pembrey, west of Llanelly, has never been constructed. It will be seen that the ruling grade of the avoiding lines, which now rejoin the main line at Llandilo Junction, Llanelly, has been kept down to 1 in 120, save for the initial ascent at 1 in 90-116 from Dynevor North Junction to Lonlas Junction. But the 1 in 120 is in trying lengths, especially up to Llangyfelach Summit, the 3-mile ascent to which from the east, and the 5-mile climb from the west, are mostly at this figure. The present Swansea avoiding lines cut the journey to Llanelly and beyond by a modest ½-mile.

Swansea itself, as is well known, is on a short branch from the main line, and as all the express trains now travel

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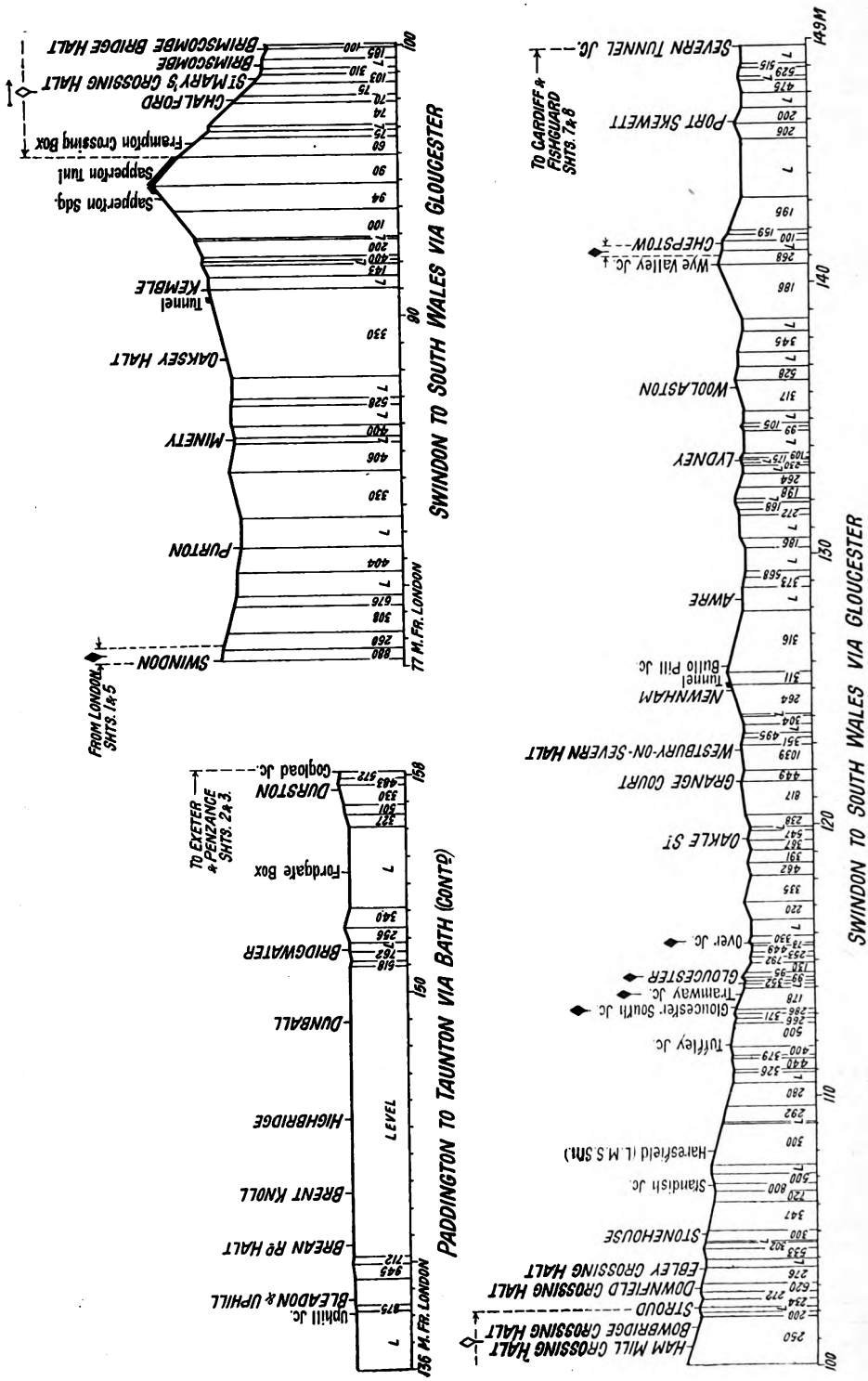

SHEET 6.—GRADIENT PROFILES, GREAT WESTERN RAILWAY.

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into and out of Swansea, instead of making connection at Landore, reversal of these trains is necessary in the High Street Station, and a distance of 2.2 miles is added to the through journey. Carmarthen is also off the main line, the old Carmarthen Junction Station being now abandoned, and the diversion entails an addition of 0.8 mile, but in this case no reversal of the train is necessary. There are some sharp undulations after Carmarthen, mostly short but gradually lengthening to the inclines up to the twin summits of Clynderwen and Clarbeston Road, where the Fishguard line diverges from the main line to Milford. Clynderwen is approached by ½-mile at 1 in 148 and 1¾ at 101, followed by 1¾ miles down at 82-83 ; to Clarbeston Road the ascent is 2½ miles at 1 in 130-139 and ⅗-mile at 107.

From Clarbeston Junction to Letterston Junction trains follow the "cut-off," which was built to shorten the distance and ease the terrific gradients of the old route to Fishguard *via* Rosebush. The steepest part of this cut-off is the dip to Treffgarne Box, a fall of all but 3 miles at 1 in 165-110 followed by a rise which is for 2½ miles at 1 in 110-108. Then, after Manorowen Box, a characteristic bank of the old Rosebush line completes the journey with a descent of 2¼ miles, of which the major part is at 1 in 50. Up this very bad start out of Fishguard Harbour heavy express trains are invariably banked in rear to Manorowen.

SWINDON TO SOUTH WALES VIA *GLOUCESTER* (Sheet 6).

This is the original main line to South Wales, and its severe gradients are concentrated in the short stretch between Kemble and Brimscombe, where it makes its way through the Cotswold Hills. The rise to the mouth of Sapperton Tunnel concludes with 2 miles at 1 in 100-94, and then, after a little more than a mile down at 1 in 90 through the tunnel, the grade steepens for 2¾ miles to between 60 and 75. From Brimscombe the line falls gently all the way to Gloucester, running parallel, for some miles from Standish Junction, with the Midland main line of the London Midland and Scottish from Bristol to Birmingham, but leaving the latter near the London Midland and Scottish Tuffley Junction in order to enter Gloucester from the opposite direction. After Gloucester the line continues by a beautifully level course along the north bank of the Severn, with miniature summits at Bullo Pill and at Chepstow ; near the latter town is enforced the only service slack along the route, over Brunel's old bridge spanning the mouth of the Wye.

DISTANCES.

Mile-posts, up side, Paddington (zero) to Taunton via Bath and Bristol (Temple Meads).

		Miles.
PADDINGTON		0·0
READING		36·0
Reading West Junction (down)		37·0
Tilehurst		38·6
Pangbourne		41·5
Goring and Streatley		44·7
Cholsey and Moulsford		48·5
Moreton Cutting (up)		51·5
Didcot East Junction (up)		52·8
DIDCOT		53·1
Foxhall Junction (up)		53·7
Steventon		56·5
Lockinge (up)		58·6
Wantage Road		60·4
Challow		63·9
Uffington		66·5
Knighton Crossing (down)		69·0
Shrivenham		71·6
Marston Crossing (up)		74·2
Highworth Junction (up)		76·4
SWINDON		77·3
Hay Lane (down)		79·8
WOOTTON BASSETT		82·9
Wootton Bassett Incline (down)		85·3
Dauntsey		87·7
Christian Malford Halt		89·9
CHIPPENHAM		94·0
Thingley Junction (down)		96·1
Corsham		98·3
Box		101·9
Bathford Halt		103·9
Bathampton		104·6
BATH		106·9
Oldfield Park Halt		107·9
Saltford		111·3
Keynsham and Somerdale		113·7
St. Anne's Park		116·7
	Miles.	
Bristol East Depot (up)	117·0	117·0
North Somerset Junction (down)		117·6
BRISTOL (TEMPLE MEADS)	A	118·3
Pylle Hill Junction	118·4	118·7
Bedminster		119·4
Parson Street		120·2
Long Ashton Platform		121·5
Flax Bourton Cutting		122·6
Flax Bourton		124·2
Nailsea and Backwell		126·4
YATTON		130·3
Puxton and Worle		133·9

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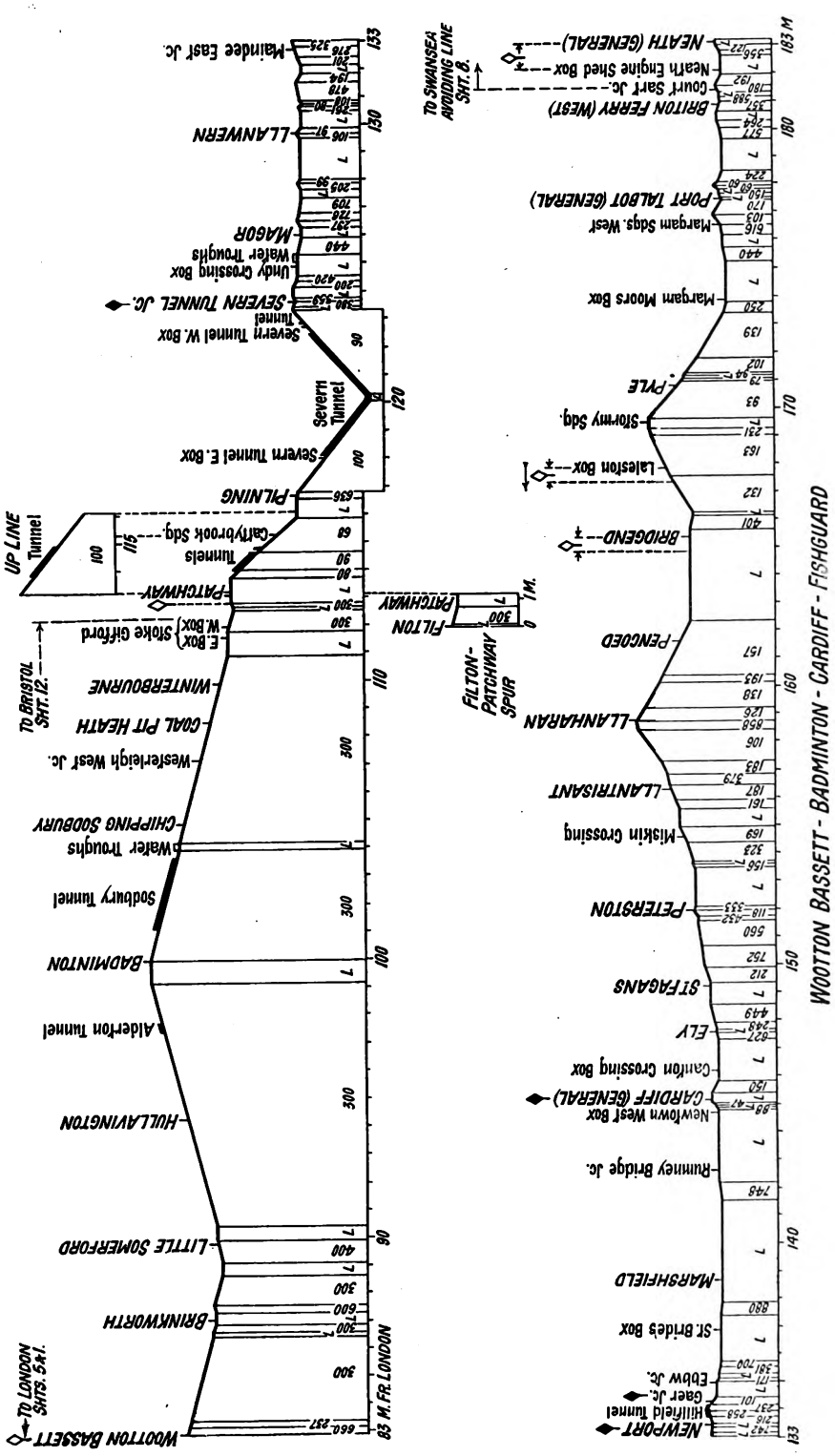

SHEET 7.—GRADIENT PROFILES, GREAT WESTERN RAILWAY.

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	Miles.	
Worle Junction	135·1	135·1
WESTON-SUPER-MARE ..	137·4	D
Uphill Junction	139·0	138·0
Bleadon and Uphill		138·5
Brean Road Halt		140·6
Brent Knoll		142·5
Highbridge		145·2
Dunball		149·0
BRIDGWATER		151·5
Fordgate		154·4
Durston		157·3
Cogload Junction (up)		158·1
Creech St. Michael Halt		160·3
Creech Junction (down)		160·7
TAUNTON		163·1
EXETER		193·9

A *Via* Relief Line.
D *Via* Direct Line.

DISTANCES.

Mile-posts, up side, Paddington (zero) to Patchway via Badminton; § up side, Bristol (Temple Meads) (zero) to Patchway and Severn Tunnel Junction; and up side Severn Tunnel Junction to Letterston Junction (from zero at Paddington via Gloucester) avoiding Swansea and Carmarthen. From Letterston Junction to Fishguard Harbour as last, but routed via Rosebush branch (1·7 miles further).

	Miles.
PADDINGTON	0·0
SWINDON	77·3
WOOTTON BASSETT	82·9
Brinkworth	87·0
Little Somerford	89·7
Hullavington	94·2
BADMINTON	100·0
Chipping Sodbury	104·6
Westerleigh West Junction (up) ..	107·2
Coalpit Heath	108·5
Winterbourne	109·9
Stoke Gifford East Junction (down) ..	111·5

	Miles.	
Stoke Gifford West Junction (up)	112·0	112·0
FILTON JUNCTION ..	112·8	
Horfield Halt	113·9	
Ashley Hill	115·1	
STAPLETON ROAD ..	116·0	
Lawrence Hill	116·6	
Dr. Day's Bridge Junction (down)	116·9	
BRISTOL (TEMPLE MEADS)	117·6	

	Miles.		
PADDINGTON ..	0·0		
BATH	106·9		
North Somerset Junction (down) ..	117·6		
BRISTOL (TEMPLE MEADS)		0·0	
Dr. Day's Bridge Junction	117·9	0·7	
Lawrence Hill.. ..	118·2	1·0	
STAPLETON ROAD	118·8	1·6	
Ashley Hill	119·7	2·5	
Horfield Halt	120·9	3·7	
FILTON JUNCTION	122·0	4·8	
Patchway	123·2	6·0	113·1
Cattybrook (down) ..	125·4	8·2	115·3
Pilning	126·8	9·6	116·7

	Miles.	Miles.	Miles.
Severn Tunnel East (up)	128·2	11·0	118·1
Severn Tunnel West (down)	132·9	15·7	122·8
SEVERN TUNNEL JUNCTION	133·7	16·5	123·6
Undy Crossing (up) ..		17·7	124·8
Magor		18·9	126·0
Llanwern		22·5	129·6
Maindee East Junction (up) ..		25·6	132·7
Maindee North Junction ..		26·1	
Caerleon		28·0	
Ponthir		29·5	
Llantarnam		30·8	
Pontnewydd		32·6	
Panteg Junction		33·8	
PONTYPOOL ROAD ..		35·3	
NEWPORT			133·4
Gaer Junction (up)			134·3
Ebbw Junction (up)			134·9
Marshfield			138·6
Rumney Bridge Junction (up)			142·6
CARDIFF (GENERAL)			145·1
Canton Crossing (down)			146·1
Ely			147·5
St. Fagans			149·4
Peterston..			151·9
Miskin Crossing (down)			154·5
Llantrisant			156·3
Llanharan			158·7
Pencoed			161·5
BRIDGEND			165·4
Laleston (down)			167·8
Stormy Siding (up)			169·5
Pyle			170·8
Margam Moors (down)			173·8
PORT TALBOT (CENTRAL) ..			177·5
Briton Ferry			180·9

	Miles.	
Court Sart Junction (up) ..	181·4	181·4
Dynevor Junction North (down)	182·6	
Llandarcy Halt	183·3	
Lon Las North Junction (up)¶	184·5	
Felin Fran Halt	185·7	
Llangyfelach (closed) ..	189·3	
Pont Lliw (closed)	191·5	
Morlais Junction East (up) ..	193·6	
Morlais Junction South (up)	194·3	
Llangennech	194·9	
Bynea	196·9	
NEATH		183·1
Skewen		185·1
Skewen East Junction (down)¶		185·5
Skewen West		186·3
Llansamlet		187·4
Swansea Valley Junction (down) ..		188·6

	Miles.		
LANDORE	189·6		189·6
SWANSEA ..	190·9		
	0·0		
*Swansea Loop West Junction (down)**	1·2		189·9
Cockett East (down) ..	2·3		191·0
Cockett	3·0		191·7
Gowerton	5·7		194·4
Loughor	7·7		196·4
Llandilo Junction East ..	9·7	197·9	198·4
LLANELLY	11·4	199·6	200·1
Pembrey and Burry Port	..	..	204·0
Lando Platform ..	..	..	205·5

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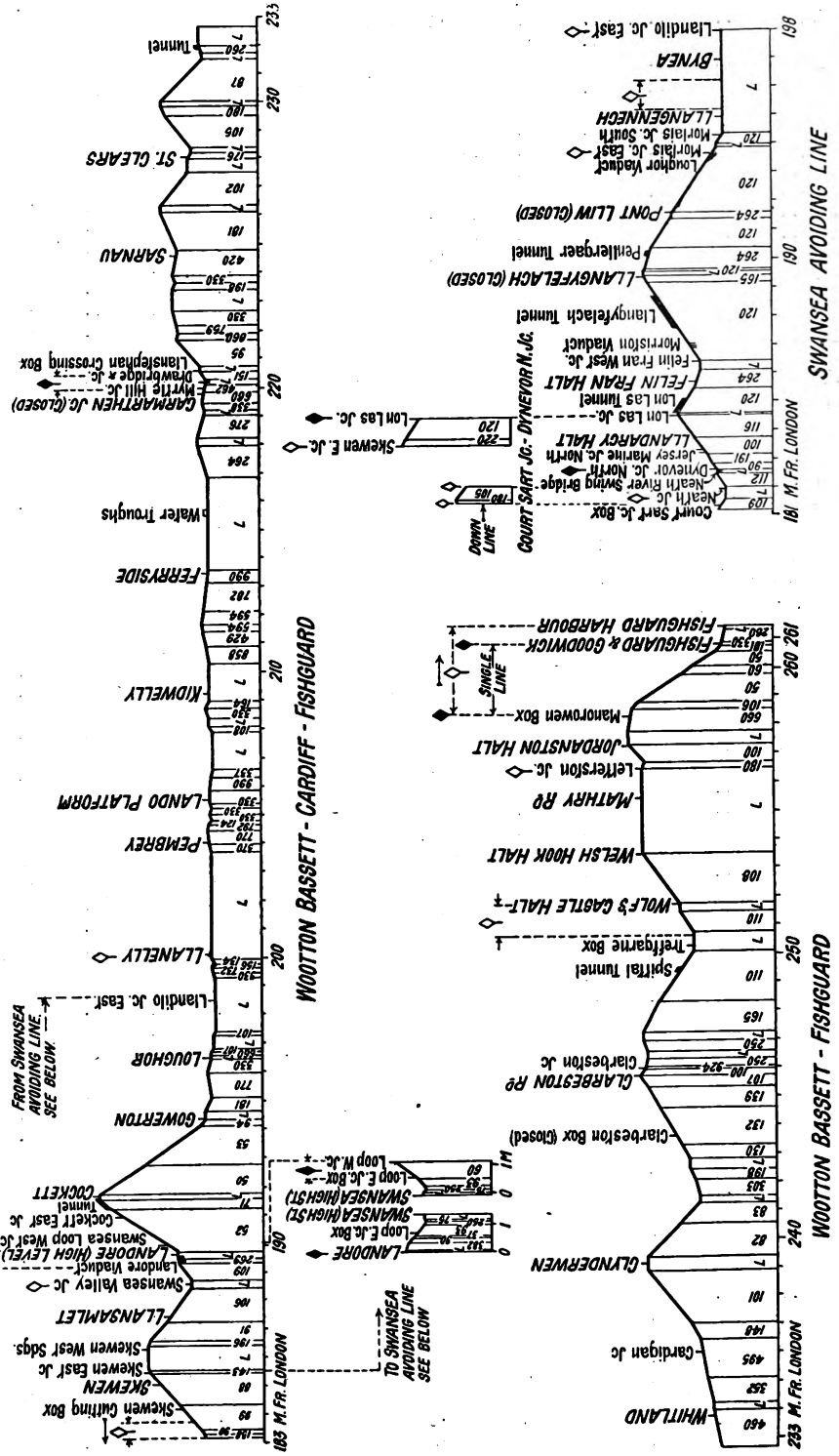

SHEET 8.—GRADIENT PROFILES, GREAT WESTERN RAILWAY.

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		Miles.
Kidwelly		209·2
Ferryside		213·4
	Miles.	
Myrtle Hill Junction (up)	219·9	219·9
CARMARTHEN	220·5	
Carmarthen Bridge Junction (up)†	221·0	220·2
Sarnau		224·6
St. Clear's		228·0
Whitland		233·7
Cardigan Junction (down)		236·0
Clynderwen		239·1
Clarbeston (up) (closed)		243·6
Clarbeston Road		245·7
Clarbeston Junction (up)		245·9
Treffgarne (up)		250·2
Wolf's Castle Halt		251·7
Welsh Hook Halt		253·4
Mathry Road		255·4
Letterston Junction (up)		256·5
Jordanston Halt		257·3
Manorowen (up)		258·3
Fishguard and Goodwick		260·8
FISHGUARD HARBOUR		261·4

NOTES :—

§ Down side, Filton Junction to Bristol, for trains from London to Bristol via Badminton.

* Up side for trains from Swansea to Llanelly.

† Down side for trains from Carmarthen.

¶ The spur from Skewen East Junction to Lon Las North Junction is 0·9-mile long.

Note.—Additions should be made to the throughout mileage for variations in the route Paddington - Badminton - Cardiff - Landore and Carmarthen Avoiding Lines—Fishguard, as under :—

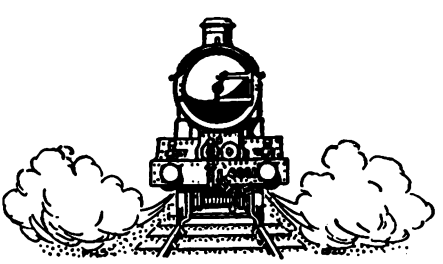
	Miles.
(1) *Via* Gloucester	25·2
(2) *Via* Bath and Stapleton Road	10·1
(3) *Via* Swansea Avoiding Lines (Court Sart Junction - Dynevor North Junction - Llangennech - Llandilo Junction East) .. *deduct*	0·5
(4) *Via* Skewen East Junction, Lon Las Junction, and Swansea Avoiding Lines to Llandilo Junction East	1·4
(5) Into and out of Swansea	2·2
(6) *Via* Carmarthen	0·8

DISTANCES.

Mile-posts, up side throughout, from zero at Paddington.

	Miles.
PADDINGTON	0·0
SWINDON	77·3
Purton	81·4
Minety and Ashton Keynes	85·4
Oaksey Halt	88·4
KEMBLE	91·0
Sapperton Sidings (down)	94·5
Frampton Crossing (up)	96·4
Chalford	98·0
St. Mary's Crossing Halt	98·8
Brimscombe	99·3
Brimscombe Bridge Halt	99·9
Ham Mill Crossing Halt	100·8
Bowbridge Crossing Halt	101·5
STROUD	102·2
Downfield Crossing Halt	102·9
Ebley Crossing Halt	103·6
Stonehouse	104·9
Standish Junction (down)	106·7
*Haresfield	108·1
**Tuffley Junction (down)*	111·9
Gloucester South Junction (up)	113·0
GLOUCESTER	114·1
Over Junction (up)	115·6
Oakle Street	119·5
Grange Court	121·6
Westbury-on-Severn Halt	122·8
Newnham	125·0
Bullo Pill (up)	125·9
Awre Junction, for Blakeney	128·3
LYDNEY	133·5
Woolaston	136·2
Wye Valley Junction	140·7
CHEPSTOW	141·4
Portskewett	146·0
SEVERN TUNNEL JUNCTION	148·8
Magor	151·2
Llanwern	154·8
Maindee East Junction (up)	157·9
NEWPORT	158·6
CARDIFF	170·3

* On adjacent L.M.S. line, down side.



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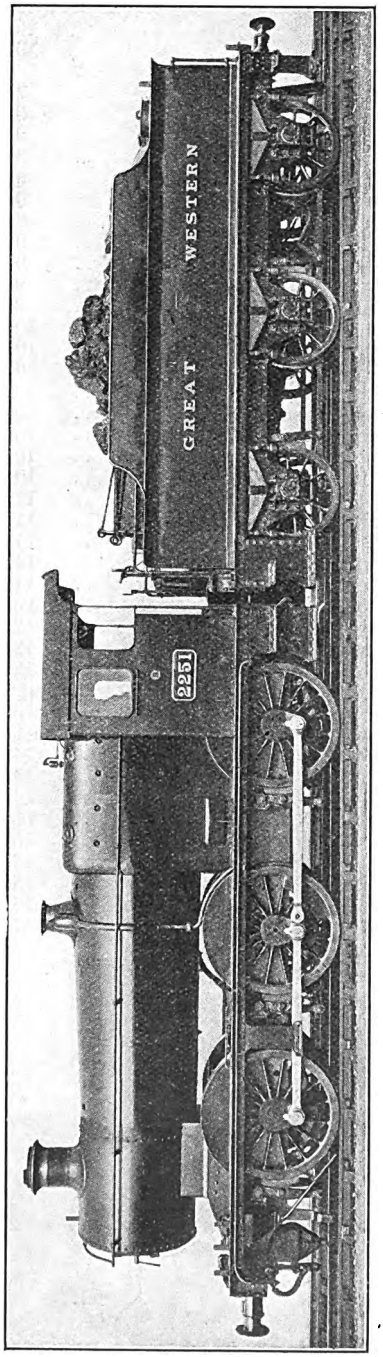
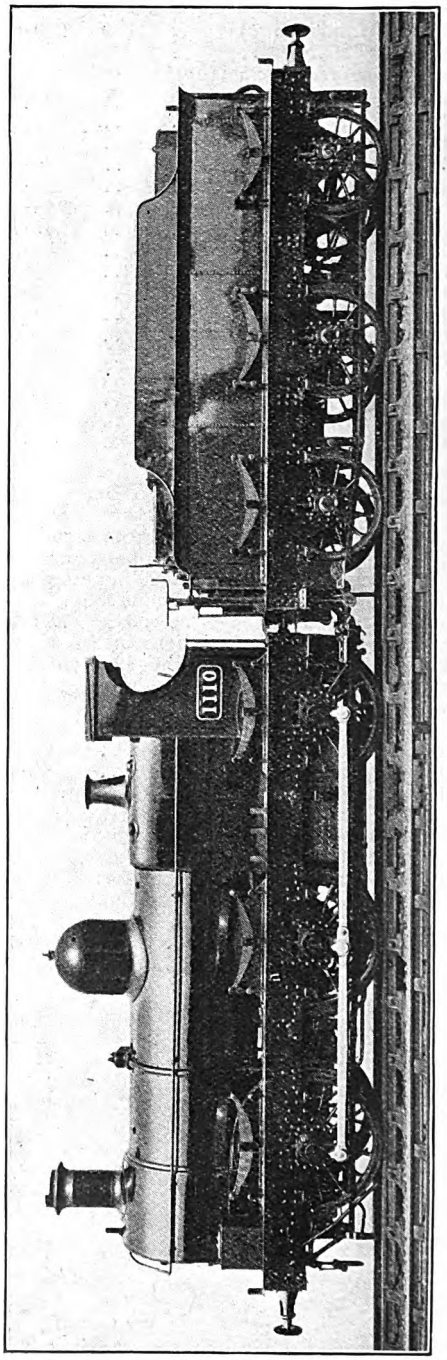


NEW 0-6-0 LOCOMOTIVE, GREAT WESTERN RAILWAY.



OLD DOUBLE-FRAMED 0-6-0 CLASS, WHICH THE NEW ENGINES REPLACE.

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New 0-6-0 Locomotives, Great Western Railway.

By the courtesy of Mr. James Milne, General Manager, and Mr. C. B. Collett, O.B.E., Chief Mechanical Engineer of the Great Western Railway, we are enabled to reproduce a photograph of a new class of 0-6-0 goods engines recently constructed at Swindon. These engines, which are equipped with taper boilers having Belpaire fireboxes and a new type of cab with side windows and extended roof, have been constructed for the purpose of replacing engines of a double-frame tender goods class that are in need of renewal. They will be used for branch service and for light main-line traffic.

The tractive effort of the new engine is 20,155 lb. at 85 per cent. of the boiler pressure, as compared with 15,685 lb. of the older engines. The brake gear of the new engine is steam operated, and the pressure on the blocks is equalised on all the coupled wheels. The equipment includes a cab-signalling device, and the tenders are fitted with water pick-up apparatus.

The main particulars are as follows:—

Cylinders, diameter	17½ in.
Piston stroke	24 in.
Wheels, diameter	5 ft. 2 in.
Wheelbase, engine	15 ft. 6 in.
Boiler, heating surface—	
Fire-tubes	1,069·42 sq. ft.
Firebox	102·40 ,,
Total	1,171·82 ,,
Superheater	75·68 ,,
Combined total ..	1,247·50 ,,
Grate area	17·40 ,,
Boiler pressure	200 lb. per sq. in.

The weight of the engine in working order, with tender, is 80 tons 3 cwt. The tender has a capacity of 3,000 gallons of water and 6 tons of coal. The engines are known as the "2251" class, replacing the older "1110" class.

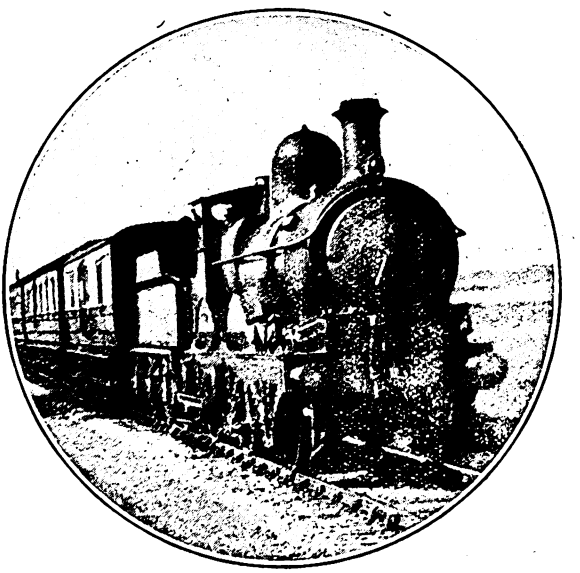

Photo.] [*E. A. Gurney-Smith.*

PADDINGTON TRAIN LEAVING AFON WEN, G.W.R. 2-4-0 No. 3207.

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Improvements at Lots Road Power House, London Underground Railways.

It is now twenty-five years since the power house at Lots Road was brought into use to supply current for the operation of the Metropolitan District Railway and the three tube lines now forming the London Electric Railway. When completed in 1905 the station was considered the most modern and efficient installation of its kind in the world, the 6,000-kW. turbo-alternators being the largest sets then constructed. The development of traffic on the London Underground Railways during the past 22 years is indicated by the fact that the car mileage run has increased by about 196 per cent. since 1908. The power house now supplies not only the Metropolitan District and the London Electric Railways, but also the Central London and City & South London Railways, and the London United Tramways.

The increased demand made by the opening of new extensions and increases in speed and frequency of the trains has been met by additions of new machinery from time to time, and in 1925 it was recognised that further additional demands on the power house could not be met adequately except by the replacement of practically the whole of the original plant.

The generating plant on the completion of the present programme will comprise nine 15,000-kW. turbo-alternators, with a station load of 105,000 kW., two sets being stand-bys. A further installation of two 15,000-kW. sets is contemplated. Thus far the work actually completed is attested by the output from the power house having been increased from 70,000 kW. in 1925 to 90,000 kW. in March, 1930. By the autumn of the present year the output will be 95,000 kW.

The original equipment comprised eight turbo-alternators of 6,000 kW. capacity each. Three extra sets, each of 15,000 kW., were installed, the first in 1915, another in 1921, and the third in 1925. Since 1925 three of the old 6,000-kW. sets have been removed and replaced by three 15,000-kW. machines. A further 15,000-kW. set is now in course of erection, displacing a fourth 6,000-kW. set. The two latest large sets are working at a higher steam pressure (275 lb. per sq. in.) and temperature (650 deg. F.). The whole of the high-tension switchgear is being replaced, the new switches having a rupturing capacity of 750,000 kVA.

An entirely new high-tension control board with B.T.-H. equipment has been erected in a new control room at the eastern end of the engine-room building, and the existing control board on the gallery will be dismantled. The D.C. auxiliary board has also been transferred to the new control room, and is in service in that position. The whole of the electrical system of the power house and feeders will thus be controlled from the new control room. An illuminated diagram will be included in the equipment to give automatic indication as to which feeders supplying sub-stations are alive. A complete new telephone equipment is to be installed, giving direct communication to all sub-stations and traffic controllers.

The original boilers comprised 64 Babcock & Wilcox land-type, each of a capacity of 16,000 lb. of steam per hour at a pressure of 200 lb. and a temperature of 500 deg. F. Eight new boilers, of the C.T.N. type, made by the same firm, have been installed, four in 1922 and four in 1925. All these have a capacity of 39,000 lb. per hour, at 290 lb. pressure and 700 deg. F.

Numerous other improvements are in hand and the completion of the whole scheme, which is estimated to cost over £1,000,000, will enable improved services to be provided with longer trains and greater frequency.

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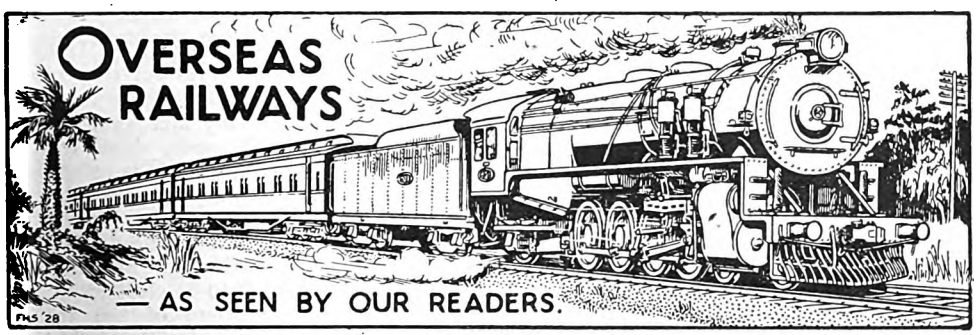

Correspondence for this section, with or without photographs, is invited.

The Natal-Zululand Railway.

In view of the reply published to a query by Mr. C. P. Griggs in "The Why and the Wherefore" Section of the February number, we are pleased to publish the following notes kindly sent by Mr. N. J. Palmer, of Johannesburg:—

"The Natal-Zululand Railway Company obtained powers under Natal Act No. 34 of 1894 to build a line from Verulam, 19 miles north of Durban and the then railhead of the Natal Government Railways, to Zugela—a distance of 50 miles. The line was opened in 1897 and 1898. I do not know if the company ever owned rolling-stock or worked the line, but it has been leased to the Government since July 1, 1907. This line now forms a section of the Natal North Coast line, but still belongs to the Natal-Zululand Railway Company and is leased to the S.A.R."

Tank-Tender Engines in South Africa.

In your March number Mr. J. P. Brierley writes on South African locomotives, and states having seen several tank-tender engines at work. These engines were introduced on the Natal Government Railway about 1901-2 as 4-10-2 tank engines and were known as "Reid" engines. The Imperial Military Railways had thirty of them built, fifteen by Dubs and fifteen by Neilson, Reid & Co. They were successful in Natal, where short runs were the rule, but in the Transvaal, where runs were longer, delay was caused by coaling and watering, and the then Loco. Superintendent converted the first, numbered 220, to a tender engine by removing the bunker and pony truck and trailing coupled wheels, fitting her with an old Cape Government Railway fifth-class engine tender, making her 4-8-0. Eventually all the I.M.R. lot were converted, some having 6-wheeled tenders and some bogie-tenders from old seventh-class engines. The cylinders were 19 by 27 in., and the leading wheels were flangeless, with tyres 7 in. broad. A peculiarity was the driving crank pin, the coupling rod bearing being double the size of the big end bearing, the big end pin being placed eccentric. They have now been withdrawn from main line work, and are ideal engines for shunting and short trips. Many of the Natal lot, which were not converted, can now be seen as shunting engines all over South Africa, but all have had the trailing wheels removed, making them 4-8-2T. Quite a number have been sold to coal and gold mining companies, and the City Deep Gold Mining Company thought so much of the type that they had two engines built, exact duplicates, about two years ago. The Ceylon Government Railways have quite a number of tank-tender engines built originally as such.—[M. M. Lean.]

Canadian Locomotives.

Your issue dated February, 1930, contains on page 149 an article by Mr. P. F. Laning, part of which reads as follows:—"The Canadian Pacific uses red equipment on its cars, but I believe this equipment is not standard; at least, in the yards at Toronto, both red and greenish-black cars were in evidence."

I would like to correct this assertion of Mr. Laning's. Both Canadian Pacific and Canadian National Railways have standard equipment, red being the colour of the former and greenish-black that of the latter. Toronto is a union station used by both companies, and doubtless this explains how Mr. Laning obtains this impression.—[R. C. P. Clutterbuck.]

Notes on Some Continental Journeys.

Mr. R. Happe, of Cambrai, sends some notes in regard to recent journeys made by him from Nice to Turin and back to Paris, via the South of France, including the flooded areas. From Nice to Turin he travelled over the new Coni line. The engine from

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Colour-Light Signalling in France.

THE State Railways have installed automatic colour-light signals from Paris (St. Lazare) to Versailles R.O. (22 km.), St. Germain (21 km.) and Colombes (8 km.); Paris (Invalides) to Versailles R.G. (18 km.); Paris (Montparnasse) to Montrouge (6 km.); and at Rouen (Rive Droit station). On the Paris-Orleans line they are used from Paris (Quai d'Orsay) to Bretigny (36 km.), and at Les Aubrais and Vierzon stations. On the Eastern Railway on the Mussey, Bar-le-Duc and Lérouville section (44 km.). The general system is:—

2 vertical lights—green—"caution" (next stop signal is less than 600 yards distant).

2 horizontal lights—green—"caution" (next stop signal is more than 600 yards distant).

2 horizontal lights—one red, one green—"stop" and then proceed slowly.

2 horizontal lights — red — "absolute stop."

1 light — yellow — "stop" (used in sidings only).

1 light—green—"reduce speed" to 30 m.p.h. as for junctions.

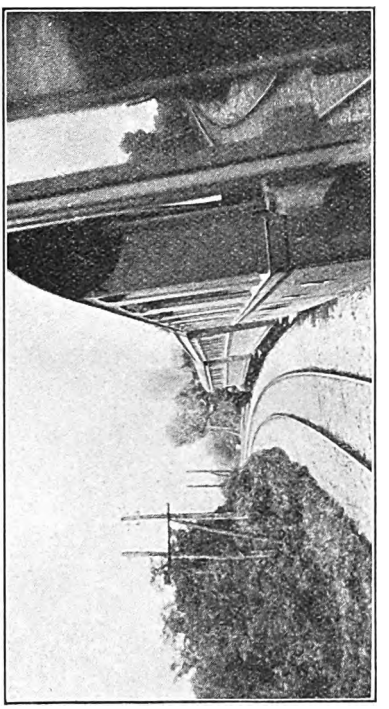
On the Paris (St. Lazare) and Versailles and St. Germain routes passengers can travel in the front of the leading car of electric trains and thus see directly ahead.

[R. HAPPE.

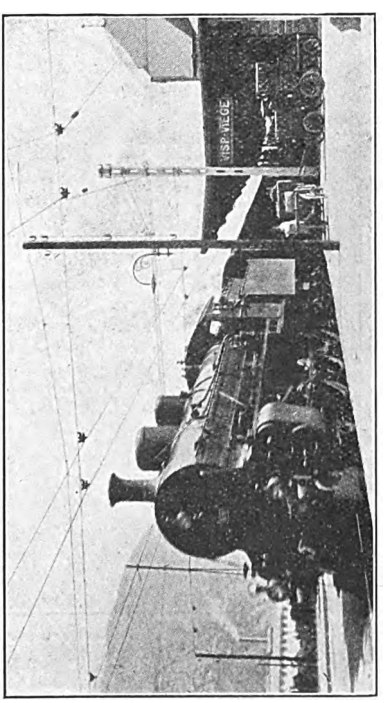
An American 2-4-4 Tank Engine.

MR. J. F. A. BLACK sends a cutting from *The Brotherhood of Railroad Trainmen's Magazine,* U.S.A., describing a 2-4-4T engine of 1878 (illustration not reproduced) as follows:—

"In March, 1878, The Baldwin Locomotive Works built a light tank locomotive of the 2-4-4 type for the Camden & Atlantic Railroad. It was named *John Lucas* and bore the road number 1, and the builders' construction number 4287. It was designed under the supervision of Rufus Hill, who at that time was Master Mechanic of the Camden & Atlantic, and was the first locomotive on the road to be equipped with air brakes. The Camden & Atlantic is now part of the P. R. R. System. The usual run of the *John Lucas* was between Camden and Haddonfield, New Jersey, a distance of 6.74 miles each way. The locomotive was in service day and night, with two engineers and two firemen, and was scheduled to make 143 miles very 24 hours. The passenger cars hauled each weighed 31,850 lbs. empty, with seating capacity for 60 passengers. The average daily consumption of anthracite coal was 3,984 lbs. During the year 1879 the locomotive made a total mileage of 34,907; the total cost per mile run, including the wages



BÂLE-MILAN EXPRESS NEAR COMO. BANKING ENGINE IN REAR. [*A. F. King-Stephens.*



Photos.] MILAN-PARIS EXPRESS AT VIÉGE, SWITZERLAND.

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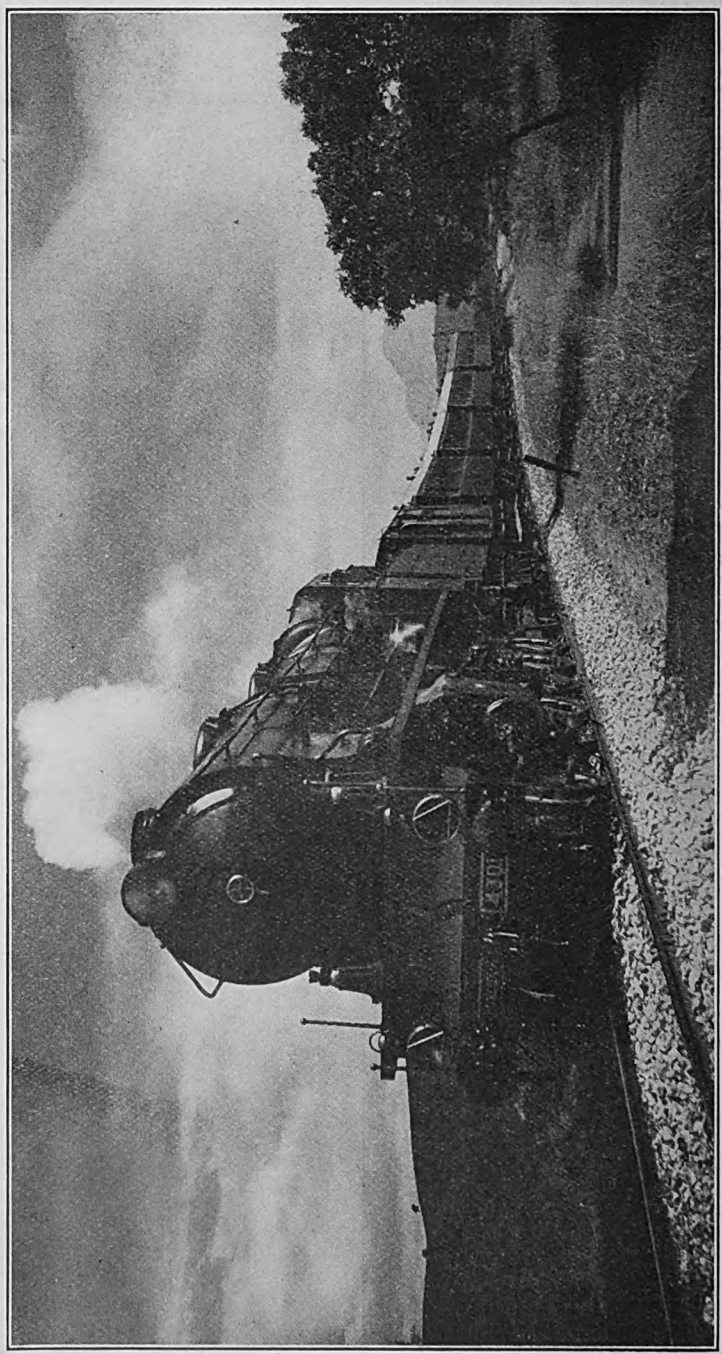

CORDOBA-MALAGA EXPRESS, ANDALUCES RAILWAY, SPAIN.

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of engineman and wipers, being 15 cents. On April 28, 1890, the locomotive was purchased by Messrs. E. H. Wilson & Company, of Philadelphia, for the Middletown Iron Works, Middletown, Pennsylvania. Its subsequent history is somewhat in doubt, but it finally landed in Dutch Guiana, and was there discovered, in 1927, by Robert Niles, Jr., a New York architect, while he was on a trip through the jungle."

Further Notes on American Railways.

THE "cars," or "carriages," in use in this country (U.S.A.) are far heavier than those in Britain, most weighing in excess of 70 tons, some as much as 90 tons. They are longer than British coaches, and somewhat wider, although the track-gauge is the same. Cars used on principal trains are of all-steel construction; wooden stock is more and more seldom seen, and even on the less important routes very old stock is not used as it is on many lines in Britain. Express trains in this country are the last word in luxury. The "20th Century Limited," for instance, running between New York and Chicago, has practically all the appointments of a first-class hotel. All the attendants on expresses, apart from the regular train-crew, are negroes, and they are very efficient and polite, too. The menu of the dining-car over here is far more varied than that found on even "The Flying Scotsman," and is not surpassed by many restaurants.

In the sleeping-cars, besides the ordinary upper and lower berths, there are compartments and drawing-rooms for those wishing still more comfort and privacy. Each sleeping car has two washrooms, one at each end. These rooms are well equipped, even to the extent of leather-upholstered couches and armchairs. The express trains have an observation car at the rear. This is just like the club car at the front of the train, with the addition of a small open platform on which are a few armchairs. Observation platforms, by the way, are great places if one doesn't mind being deluged with soot. There is, of course, no third-class on railroads over here, but there is the equivalent "day-coach," which is the popular type used by the commuter and the short-distance traveller. However, for long day journeys, it is more comfortable to use the Pullman chair-car. The "chairs," deep and comfortable, are placed one at each window, and are mounted on swivels so that the passenger can face where he pleases. The all-Pullman trains carry no day-coaches, of course, but many important trains carry both day-coaches and chair-cars, there being an extra charge for a "chair."

Locomotives are immense affairs, when compared with the usual British type. Their only appeal, however, is in their size, for they are unattractive, with a maze of disfiguring external fittings. Old-fashioned engines are rarely seen in this country, and on the main lines one sees only the most modern types, hardly ever more than a few years old. Certainly the roads over here would never think of keeping in use the twenty- and thirty-year old engines like the British railways do. American locomotives, because of the immense loads they pull, are worked very hard, and their lives are short. They appear very much more complicated and do not appeal so much as their British brethren.

The stations in the large cities of the U.S. and Canada are amazing structures to the visitor from abroad. The Grand Central terminal in New York, for instance, cost $150,000,000 to build, and as a result is one of the city's show places. There are 67 tracks on two levels, 42 on the upper level for express trains, 25 on the lower level for suburban traffic. All trains using the Grand Central are hauled by electric locomotives, the N.Y.N.H. & H. route being electrified as far as Boston (229 miles), while the N.Y. Central trains change to steam haulage at Harmon, 33 miles away. The Pennsylvania R.R. station in this city is similar, but perhaps not quite so magnificent. It cost a mere $115,000,000.

Road beds in the U.S., with a few notable exceptions, are far inferior to those in Britain, and some of the track laid, even on express routes, would not be allowed in a Scottish quarry. Troughs for picking up water on the run are not so commonly used as on British lines. There are few non-stop runs made, even on moderate-length runs. Slip-coaches, as far as I am aware, are unknown. The longest non-stop run in this country is less than 200 miles.

The two most famous trains over here are, perhaps, "The 20th Century Limited" on the N.Y. Central, and the "Broadway Limited" on the Pennsylvania. Both run from New York to Chicago in 20 hours, the Pennsylvania having a shorter but harder route. The distances on the two routes are 960 and 908 miles, respectively, while the average speeds for these enormously heavy trains are 48 m.p.h. for the "Century" and 45.4 for the "Broadway." These trains are so popular they always run in several sections. —[DOUGLAS L. THOM.]

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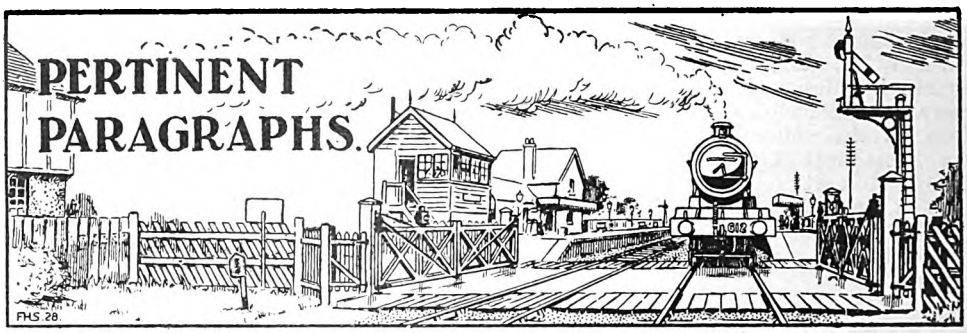

The Channel Tunnel Report.

THE Report of the Channel Tunnel Committee, a lengthy document, running to 111 pages, begins by disposing of all suggested forms of cross-Channel communication alternative to the Channel Tunnel. In the opinion of the three eminent firms of consulting engineers whose report is appended there can be no certainty as to whether the geological and engineering difficulties can be overcome until the proposed pilot tunnel, the construction of which is estimated to take five years, is successfully driven right across the Channel. If this is done, however, and the Channel Tunnel subsequently constructed, they consider that the work should be carried out by private enterprise and should not be accorded any special financial assistance by Government. They do not feel called upon to express an opinion as to whether the risks involved or the prospects of financial reward are sufficient to induce private enterprise to take up the proposal, although they *believe* that it could be built, maintained and operated at a cost (estimated at £30,900,000 for the tunnels only), which would permit of traffic being conveyed at rates not higher than the present. Finally, they *believe* that, although some interests would probably be adversely affected, the Tunnel, by creating new traffic and thus increasing trade, would be of economic advantage to the country.

It will be seen that these conclusions are really a series of hypotheses, each dependent upon the realisation of the one before, which does not seem to argue any excess of enthusiasm on the part of the Committee. Furthermore, Lord Ebbisham, in his minute of dissent, comes to the conclusion that, even granting all these hypotheses, any resultant advantages are uncertain, and at the best, slight in extent, whilst there would be a definite detriment to substantial portions of established industries, *e.g.*, shipping and agriculture. After taking everything into consideration, he is opposed to the scheme on economic grounds —but there were the only grounds upon which the Committee were asked to consider the scheme.

Traffic Estimates.

THERE were considerable variations in the traffic estimates. As regards passengers, the Channel Tunnel Company estimated about 3,600,000 in 1936. For the same year, the Southern Railway Company estimated a total of about 1,525,000. Taking the year 1940 as a basis for the first year of operation, the Northern Railway of France estimated the number of passengers at 3,200,000. In view of this disparity, the Committee undertook an independent investigation, and fixing 1938 as the first year of operation, they estimate that about 2,357,000 passengers might use the Tunnel in that year, the adjusted estimate of the Southern Railway to compare with this basis being 2,042,000. As regards goods, the Southern Railway estimate that, in the first year of operation, there would be an increase of 50 per cent. in the total tonnage that would otherwise be carried by the Dover-Calais and Folkestone-Boulogne routes, and the Committee consider this estimate moderate.

In a statement to the Press Association, Sir Herbert Walker, General Manager of the Southern Railway, said:—

" The tunnel would undoubtedly increase the amenities of travel between England and the Continent. It would also facilitate and expedite the transit of perishable goods from France and other Continental countries to England. The estimate of £30,900,000 provides, however, only for the construction and equipment of the tunnels themselves. Considerable additional sums (impossible to estimate at the moment) would have to be spent on both sides of the Channel in the provision of the necessary exchange stations, customs facilities, sidings, electric power houses, electric locomotives, &c., and of new rolling-stock suitable for working over the English and Continental railways.

" So far as the Southern Railway is concerned, the construction of the tunnel must

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inevitably increase the traffic—both passenger and goods—between England and the Continent, and this, in course of time, will redound to the benefit of the company, but unless satisfactory terms can be arrived at with the promoters of the scheme, it is unlikely that for the first few years the increase in traffic will be sufficient to reimburse the company for the loss that will be incurred in the elimination of their fleet of vessels, and in the provision of the additional capital already referred to.

"Taking a long view, I am of opinion that the Southern Railway should ultimately benefit by the building of the tunnel, but from the national point of view, I am in accord with the conclusion arrived at by Lord Ebbisham. I think the tunnel will take more money out of this country than it will ever bring into it. I am, moreover, unable to agree with the Committee's estimate of the number of passengers who would be likely to make use of the tunnel in 1938, provided the tunnel is constructed and in use by the beginning of that year."

Maxstoke Station.

MR. T. R. PERKINS, of Henley-in-Arden, writes:—"This station, which has recently been illustrated in several daily newspapers as a railway curiosity, was known as Coleshill from its opening in 1839 until its closing for passenger traffic in 1916, when its name was changed to Maxstoke Goods. Its chief claim to notoriety lies in the fact that the line upon which it is situated—the Hampton branch of the former Midland Railway—was for a short period after its opening a main line, and formed, in fact, the only route between London and the North *via* Derby. An express service was run between Derby and Hampton, connecting at the latter station with the trains of the London and Birmingham Railway. The opening of the Leicester-Rugby section of the Midland Counties Railway, on July 1, 1840, provided a shorter route between London and the North than that of the Birmingham and Derby Junction Railway *via* Hampton and Coleshill, and for several years a fierce war of cut-rates was carried on by the two companies, until the absorption of both of them into the newly-formed Midland Railway in 1844. Thenceforward the importance of the Hampton branch speedily declined, especially as a direct line had now been made from Whitacre, 2 miles north of Coleshill, to Birmingham (Forge Mills station, on this line, has now been renamed Coleshill), and for many years before the discontinuance of passenger traffic the service had consisted of but one train each way daily. The line had long been reduced from double to single track, and the trees and bushes which had been allowed to grow unchecked on the sides of embankments and cuttings gave it a very picturesque appearance. One daily goods train each way still runs between Whitacre and Hampton. A description of the line, with illustrations, appeared in THE RAILWAY MAGAZINE for October and November, 1902, pp. 309, 310 and 393.

Southern Railway "Sunshine."

THERE is no lack of variety in the latest batch of Southern Railway posters—seven in all—which have just come to hand. Foremost among the larger of the series is that calling attention to the facilities the company now provides for visiting the dockyards at Chatham, Portsmouth, and Devonport. The chief feature of this is a man-o'-war undergoing repair in dry dock, with a couplet from Kipling attached. The detail is good and the colouring very striking; indeed, the poster is one of the best we have seen for a long time.

"Sunny South Sam," the smiling official who is always "at your service," is the subject of another large poster—a poster which may be said to have leapt into popularity immediately it was first exhibited. It is in black and white, and is in pleasant contrast to the dockyard poster previously dealt with.

"South for Sunshine" is the caption given to a third large bill advertising the company's "Hints for Holidays" guide book, which was reviewed in a recent issue of this paper. It is just the thing to catch the eye and evoke an admiring smile, as it shows four happy youngsters, "mit nodings on," having the time of their little lives on the sands by the sunny sea.

The new casino at Dinard—"La Reine des Plages"—is depicted in the fourth of the large posters. It is brilliantly coloured and full of animation, the human form divine being very much *en évidence*.

Because of its simple but pleasing design and appropriate colouring—a harmony of tender green and black-and-white and daffodil yellow—the small poster, "Greet the Spring," is an easy first, the idea being that one does this with a go-as-you-please ticket on the Southern Electric. Good, too, in their several ways are the remaining small posters—one depicting a flashing vision of the "Southern Belle" on its 60 minutes' non-stop run to the coast, and the other a glimpse of a red-and-blue bather taking a header into the briny. The last-named is an advertisement for the "Hints on Holidays" handbook aforesaid.

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Composite Trains on the L.M.S.R.

MR. C. TAYLOR, of Cirencester, sends some interesting notes on various aspects of L.M.S.R. train working, which besides providing replies to certain queries which have been published in recent issues, bring out several points which seem to be worthy of reference. In connection with the winter composition of the "Sunny South" express, Mr. Taylor mentions that the northbound train includes brake composites from Ramsgate to Liverpool and Hastings to Liverpool, a brake composite kitchen and dining car and third brake for Manchester, and a brake composite for Birmingham. Another interesting train is the 10.35 a.m. ex Euston, which usually consists of a brake composite for Pwllheli, a composite third brake for Llandudno, a brake composite third and dining and kitchen car for Carlisle, and brake composites (one each) for Windermere, Whitehaven, Blackpool (Talbot Road) and Swansea, with a third as far as Stafford. The different sections return on various arrivals at Euston, covering, in fact, five separate trains. In summer the work of the 10.35 a.m. ex Euston is replaced by two or three different trains.

Some Further Train Working Notes.

MR. TAYLOR also comments upon other interesting through working arrangements and further matters. Thus, in regard to the G.W.R. 2.30 p.m. from Cheltenham, he points out that three vehicles only start from that place, these being worked by a 2-6-2T *via* the avoiding line, Engine Shed Junction, Gloucester, to the connection with the Gloucester-Swindon line, where the Gloucester portion proceeds round the curve and backs on to the other vehicles, thus completing the train for its journey to Swindon and its record non-stop run to London. With regard to the Bournemouth-Manchester trains, Mr. Taylor points out that there are two of these, the L.M.S. "Pines Express" travelling *via* the S.D.J.R. to Cheltenham and Birmingham, and the G.W.R. and S.R. service proceeding *via* Reading (West), Oxford and Edinburgh. The former leaves Bournemouth (West) at 10.20 a.m., reaching Crewe at 3.56 p.m., while the latter starts at 9.35 a.m. and arrives at Crewe at 3.57 p.m. The journey is completed together, Manchester being reached at 4.50 p.m. This working does not, of course, apply in the summer and when the "Pines Express" travels *via* Walsall, nor in the case of the return services.

Referring to a recent puzzle train service query, Mr. Taylor points out that the 8.45 p.m. from York to Newcastle, L.N.E.R., only carries vehicles of all four group companies on Mondays, Wednesdays and Fridays, seeing that the Bournemouth-York express is provided on alternate days by the L.N.E.R. and the S.R., so that it is only when S.R. stock is used that the four companies are represented. He suggests, further, that the Bournemouth-York expresses provide the only instance of a service regularly performed over lines belonging to each of the four big companies, in that the Bournemouth-Bradford through coaches use the S.R. as far as Basingstoke, the G.W.R. thence to Banbury, the L.N.E.R. forward to Penistone, and the L.M.S.R. to Bradford.

L.N.E.R. Engines to be Broken Up.

THE following notes are taken from a lengthy contribution to the *L.N.E.R. Magazine*, by Mr. S. Groom, Locomotive Running Superintendent, Scottish Area, L.N.E.R.:—

During 1930 the following engines have been scheduled to be broken up:—Southern Area, ten 4-4-0 passenger tender engines of the D.13 Class. These engines were built between 1887 and 1897 by Mr. James Holden for service on the Great Eastern Railway. They were 2-4-0's with 7-ft. driving wheels, but between 1905 and 1908 were rebuilt as 4-4-0's. Other four-coupled engines to go are ten of the 2-4-0 mixed traffics (Class E.4), built between 1891 and 1902 by Mr. Holden.

In the North Eastern Area eleven 4-6-0's (Class B.13) are to be scrapped. They were designed by Mr. W. Worsdell and built between 1899 and 1909. There are also twenty-two 4-4-0 passenger tender engines from classes D.22 and D.23, built between 1887 and 1891.

In the Scottish Area, the five engines selected are of the D.25 Class, built in the late 1880's by Mr. M. Holmes. Also ten four-coupled passenger tank engines of the G.4 type are included. These engines were built by Mr. Holden in the years 1899 and 1901 for the Great Eastern Railway.

The North Eastern Area's quota of four-coupled tank engines includes ten 2-4-0 side tank engines—Class F.8, built between the years 1886 and 1892, and five 0-6-2 side tank engines, Class N.8, which were built between the years 1886 and 1890. A 0-4-0 shunting tank engine, Class Y.7, is also on the list. This engine is one of the class which was built for shunting at Docks where the curves are most acute.

The remaining four-coupled engines included in the list are five 4-4-0 passenger side tank engines, Class D.51, in the

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Scottish Area. These were built in the early '80's by Mr. D. Drummond for service on branch lines where the traffic was light, and where the permanent-way was laid with rails of a light section. Their place on the smaller branches is being taken by Sentinel Cammell cars.

The Southern Area list includes 19 eight-coupled engines, 5 tender engines, Class Q.1, and 14 side tank engines, Class R.1. The engines of the Q.1 Class were built between 1901 and 1909 by Mr. H. A. Ivatt for mineral trains on the main lines on the Great Northern Railway. The side tank mineral engines of the R.1 Class were built between 1903 and 1906 by Mr. H. A. Ivatt, for the Great Northern Railway, and have been used for heavy colliery work in the Nottingham and Derbyshire District.

The remainder of the scrapping programme consists of 63 engines of the older six-coupled engines, both tender and tank of various classes, and spread over the whole of the system.

Further Notes on Blackpool Traffic.

COMMENTING upon Mr. Prescott's notes as given in the April number, Mr. J. E. N. Ashworth writes:—

"As regards the 'predominance of standard superheater 0-6-0's,' this certainly is the case on some Saturdays, yet on others but few are seen, and 2-6-0 locomotives are in a large majority (I cannot account for this). The majority of the Midland division class 4F locomotives come from Leicester and Sheffield. An unusual locomotive observed on several Saturdays on the new line to Blackpool (C) was 2-4-0 No. 246. I also observed 4-4-0 No. 528 one day, from Midland shed 7 (Gloucester). Another unusual engine temporarily shedded at Blackpool (C) shed during the Blackpool Illuminations was 4 ft. 6 in. 2-4-2 tank No. 6538. This operated a four-coach motor set between Blackpool (Central) and St. Annes-on-Sea on Saturday and Sunday evenings. A similar set was in use on August Bank Holiday. As Mr. Prescott states, L. & Y. 4-4-0 locomotives are very rare here now. Last summer I observed No. 10179 and 10158 two or three times only. I believe these are the only 7 ft. 3 in. 4-4-0 locomotives left. The 6 ft. (Beyer Peacock) 4-4-0 locomotives are not often seen here, but they are common enough round Manchester and Liverpool. Atlantics are not often seen now; all those which used to be shedded at Blackpool Central are scrapped."

Exchange Station, Liverpool, L.M.S.R.

A SOMEWHAT extraordinary letter sent to the L.M.S.R. has been forwarded to us, the general burden being, first, that on the basis of Mr. J. F. Gairns' article on this station, published in the March number, the anonymous writer was incommoded because he found that the 10.55 a.m. train for Manchester, mentioned in the article, had gone at 10.40 a.m., and, secondly, that certain remarks in the article were not correct. It was, however, made clear in the article that the train services reviewed were those of the Summer Services, and as, last summer, the train in question left at 10.55 a.m., it was correct to give it thus in the article, notwithstanding that its winter departure time is 10.40 a.m. As to the general complaints, the writer of the letter may or may not be correct, or it may be, as is often the case, that the alleged inaccuracies whittle down, on examination, to statements which, although generally correct, do not apply in all cases, with one or two instances of misunderstanding or actual inaccuracy. It is to be regretted that the writer of the letter did not give his name and address, though we hope that he will see these notes. We are sorry that any inconvenience should have been caused to him, but would suggest that articles on station train services must be read on the basis of their recognised application, with the further point that, even if the train services of the date of preparation for press had been concerned, there would always be the risk of alteration. It is, indeed, something in the nature of a compliment that one of our articles should be used in place of a timetable, but we cannot take the responsibility for up-to-date accuracy in that respect, especially if the article does not purport to cover the train services of the winter period during which it was published.

We regret to hear of the death on March 25, practically contemporaneously with the publication of last month's issue of THE RAILWAY MAGAZINE containing his portrait, of Mr. J. Abram, Stationmaster at Exchange station, Liverpool.

South Leith Old Passenger Station.

THE following notes, contributed by W. N. K., which we now reproduce, are extracted from the March *L.N.E.R. Magazine*:—

Our photograph, for which we are indebted to Mr. George Findlay, dock checker, South Leith, shows the old Passenger Station at South Leith which, it is interesting to recall, was the Leith terminus of Edinburgh's first railway—the Edinburgh & Dalkeith, or "Innocent," Railway—incorporated by Acts of Parliament dated 1826, 1829, and 1834.

The railway, which was opened in 1831,

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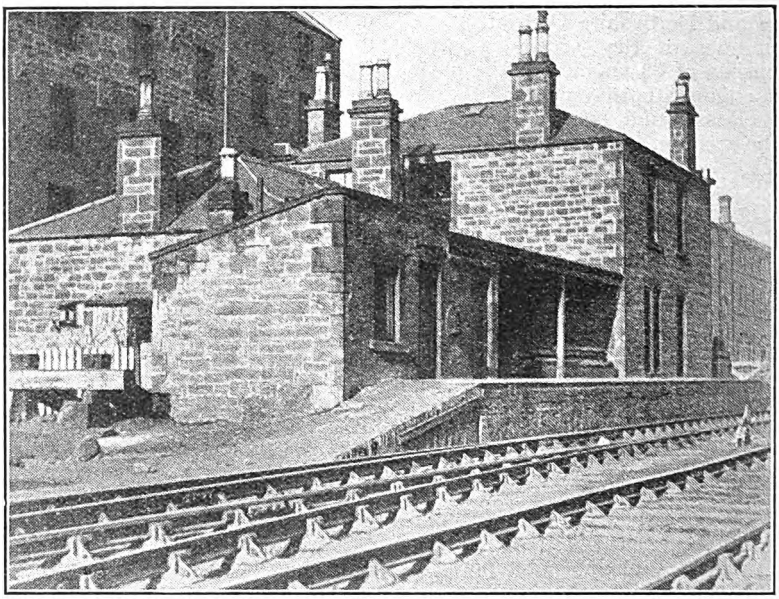
was, during the period of its independent existence, worked wholly by horses. It ran from the then suburb of St. Leonards, Edinburgh, *via* Niddrie, to the river South Esk, near Dalhousie, having branches from Niddrie to South Leith *via* Portobello, and to Fisherrow, and also from a point now called Glenesk Junction to Dalkeith.

While a horse railway, the gauge was 4 ft. 6 in., with fish-bellied rails set in freestone blocks measuring 24 in. by 18 in. by 8 in., broken whinstone being used for ballast. On the Edinburgh & Dalkeith Railway being acquired by the North British Railway by an Act dated 1845 the gauge was adjusted to the standard of to-day (4 ft. 8½ in.), to admit of working by steam locomotive, which began in 1847.

Up to 1903 a passenger train service was run between Portobello and South Leith, the platform at Portobello being at the site of the existing Control Office there. In 1903, with the advent of the Leith Central branch and station, the Portobello-South Leith line was closed for passenger traffic, and South Leith ceased to be used as a passenger station. Our picture shows the 100-year-old station buildings as they are to-day.



Photo] OLD PASSENGER STATION, SOUTH LEITH. [*George Findlay.*

The Bishops Castle Railway.

In the February, 1909, issue, Mr. T. R. Perkins described this interesting but little-known line, which, incidentally, still maintains its independence, though it has for many years been in Chancery, Mr. W. Roberts, of Wrexham, being Receiver and Manager. It was incorporated in 1861, and its length of 9¾ miles opened for traffic on February 1, 1866. There are two locomotives, six coaching vehicles and 19 goods vehicles. It runs from Stretford Bridge Junction, on the Shrewsbury and Hereford Joint line, near Craven Arms, to Bishops Castle. There is a halt at the junction near Craven Arms, to which place Bishops Castle trains exercise running powers. The intermediate stations are Horderley, Plowden, Eaton and Lydham Heath. It was proposed at one time to run from Lydham Heath to the Cambrian line near Montgomery, but this proposal never materialised. It is not intended at this point, however, to tell the story of this line again, but we are reminded of it by the receipt of a long and interesting letter of the reminiscence character received from Mr. Harry Mullard, now foreman fitter at the L.M.S.R. locomotive depôt at Preston, but who, in his early days, resided in the vicinity of the Bishops Castle line.

As a small boy interested in the line, he seems to have spent much of his spare time in producing models, more or less like the real thing, of the engines then in use. He recalls that in

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1886, owing to very heavy rains and the flooding of the river that runs alongside the line for a good part of its way up the valley, one of the engines, in passing through the water, had its fire put out near Horderley station. The engine was therefore uncoupled from the coaches and run about 200 yards up the line with what steam remained in the boiler, and it had to be left there for about a fortnight, as the floods had caused part of the embankment to be washed away near Plowden, and it was consequently shut in. In due course, this engine was used to work between Craven Arms and Plowden, while the other engine ran from Bishops Castle to the washout, passengers being conveyed between the two trains by horse-drawn vehicles.

A Trip on the Engine.

THIS period included some of the "most glorious days" of his life, especially when he was told that he could travel with the engine on the Sunday when it was going to Craven Arms to fetch wagons filled with ballast for repairing the embankment. He could hardly sleep the previous night for excitement, and got up at 4 a.m., necessitating his wandering about the engine shed and admiring the engine until the driver put in an appearance at 8.30 a.m. Even then steam had to be raised before a start could be made. About a mile on the way to Craven Arms some horses were seen on the line, and he was sent to drive them off. However, he seems to have enjoyed himself, in that he was very loth to obey the driver's instructions to get something to eat, although it was then late in the afternoon. Another incident, which resulted in a scolding from his mother and a thrashing from his father, arose from his acquired ability to imitate the puffing and whistling of the engine, in that he thus caused an old lady, who apparently acted as stationmistress and gatekeeper, to open the gates for a train, under the impression that a special was coming through, there being no telegraphic or telephonic communication along the line at that time. "Among the various odd jobs that I was allowed to perform was that of winding and lowering the signal lamp, as usual with the old-fashioned signals of that date." Mr. Mullard mentions that the line passes through "some very pretty scenery, as it winds its way up the valley with the river alongside, while at times it is possible to pluck wild roses and honeysuckle from the railway carriage windows." These remarks in regard to this peculiar and little-known line will no doubt be read with much interest by many of our readers.

In Legal Difficulties.

MR. MULLARD also recalls the story of an occurrence narrated by Mr. W. Beddoes in the June, 1899, issue of *The Railway Magazine*. The Bishops Castle Railway ran through the land of a Mr. Frank Beddoes, and, on his death, it was found that this land had never been paid for, in that Mr. Beddoes, who was a liberal-minded landowner, had allowed things to slide, taking the broad view that the railway was a public convenience and the loss to him of a few acres of land not much one way or another. However, the lawyers thought differently, and, as payment was not forthcoming, the bailiffs removed a couple of rails near Horderley, thus stopping traffic. Apart from inconvenience caused to the Bishops Castle Railway, there were wagons on the line belonging to the L.N.W.R., and, as described by Mr. Beddoes, a grand council of war was called in the back parlour of a well-known hostelry at Craven Arms. Furthermore, and somewhat mysteriously, a shunting engine in the yard was unusually busy and everything for the Bishops Castle line found to be ready coupled up in a siding. Moreover, the day signalman at the junction box was "hanging about in the vicinity of his cabin; no one seemed to know why." The net result of these and other happenings was that the bailiffs were induced to return to a neighbouring inn, thus enabling some platelayers to replace the rails, a train following immediately communication had been completed. We gather that the situation was then amicably settled, though the particular point of interest in connection with the matter is that Mr. Mullard's father was one of those concerned. The engines, which are, we believe, those still in use, are an old G.W.R. four-wheeled coupled side tank and a 0-6-0 tender engine named *Carlisle*, which must by now have completed well over forty years' service.

The Peak Forest Tramway.

MR. R. DYSON writes:—"Being a frequent visitor to Chinley, I have noticed the gradual disappearance of the remaining portions of this old line with great interest. Up to about four years ago the rails were still in evidence at Chinley, but now all that remain of the track are the stone rail-supports, overgrown with grass and moss. In one part a substantial new road has been made along the track-bed, with tenanted property alongside. Another interesting feature in this area is located adjacent to Pritchard Green, near Chapel-en-le-Frith. This is a railway notice-board relating to the limits of weight for

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vehicles over a small bridge nearby. The notice is headed GREAT CENTRAL RAILWAY COMPANY, and after the usual reference to an Act of 1898, and the text, is terminated with the words WILLIAM POLLITT, GENERAL MANAGER. The curious part about this notice-board is the vicinity in which it stands. Barely a quarter-mile to the west lies the L.M.S. (L.N.W. section) Manchester-Buxton line, while in easterly and southern directions, about 1½ miles distant, the L.M.S. (Midland) main line from Manchester to Derby runs. The nearest L.N.E. station is a good 7 miles away, at Hayfield.

"Whilst speaking of the Peak District, I might mention that the signalling between Edall and Hope, on the Chinley-Sheffield, L.M.S., line, is now of the upper-quadrant type. There are still long stretches of the old Manchester-Buxton route (prior to the later L.N.W. route *via* Chapel-en-le-Frith) in evidence, though all rails have long since been removed. Several of the old notice-boards are still standing, and the tunnel near Buxton can still be seen. On looking up and down the ground where the line used to run, the gradients seen show what difficulties must have been encountered when the route was used. Several of the old bridges are still standing, one carrying the Manchester-Buxton main road over the track-bed."

Some Anglo-Scottish Locomotive Notes.

"G. T. G.," WRITING from Stockton-on-Tees, sends notes as to engines employed on trains by which he travelled, or which he noted in the course of a journey from Darlington to Carlisle, via Hawes Junction, returning via Newcastle. These included "Claughton" engines on Carlisle-St. Pancras trains, in one case *Sir Gilbert Claughton* itself; a West Coast-Edinburgh and Glasgow express worked onwards from Carlisle by 4-6-0 No. 6127, *Novelty*, piloted by a Caledonian 4-4-0, No. 14461; and L.N.E.R. three-cylinder 4-4-0 *Bedfordshire*, together with N.B. 4-4-0's Nos. 9360, *Guy Mannering*, and 9898, *Sir Walter Scott*, working between Newcastle and Carlisle, and L.N.E.R. 4-4-2 and 4-6-2 engines on Carlisle-Edinburgh services.

The Four 8.5's.

WITH regard to Mr. L. C. King-Wilkinson's train service puzzle query set forth last month, the solution is that three trains leave Chapel Street station, Southport, at 8.5 p.m. respectively for Preston, Manchester and Liverpool, while at the same time a Cheshire Lines train leaves Lord Street station for Warrington and Manchester.

By the same post three readers sent in correct replies—Mr. A. A. B. Brown, of Marlborough, Wilts; Mr. J. R. Hollick, of Ashbourne, Derbyshire; and Mr. R. Hogan, of Church, Lancs. Mr. J. M. Drysdale also sends the same solution.

The Aylesbury and Brill Tramroad.

MR. W. GOODYER, of Swaffham, writes:—"In regard to Mr. A. G. J. Mosley's letter published in THE RAILWAY MAGAZINE for November last, *re* the Aylesbury and Brill Tramroad and the locomotives formerly used thereon, I would like to mention that on January 21 I saw a traction engine adapted for rail service working in Messrs. Hall & Co.'s yard near East Croydon. This retained the usual characteristics of a traction engine, including geared drive, etc., but had, of course, flanged wheels and was fitted with outside axle-boxes. I thought this might possibly be one of the engines mentioned by Mr. Mosley, and am writing to you for your opinion on the subject."

Irish Locomotive Notes.

MR. A. J. COGHLAN writes:—"G.S. 2-4-2T No. 431 has been sent to Bray shed from Inchicore completely overhauled, and has now a smokebox fitted with doors of the double-folding pattern, similar to those on the McDonnell engines of the late G.S.W.R. No. 432 of the same type has also been refitted and sent to Grand Canal Street, but retains the old type smokebox. Both of these engines still have Ramsbottom safety valves. 0-6-0 No. 446 is now running with her own tender, after having been in service for some time with an old D.S.E. outside spring type tender, said to have been built by Sharp, Stewart & Co. for the 0-4-2 engines built in 1876. 4-4-2T No. 455 has been working from Bray shed for some time, the first D.S.E. 4-4-2T stationed here. During 1929 the G.S.R. built seven engines, *i.e.*, 2-6-0's Nos. 390-1, and 0-6-0's Nos. 700-4. No. 49, 0-4-4T, now works between Westland Row and Dalkey. The special train on March 7, run from Harcourt Street to Rosslare in connection with the Rugby match at Swansea, was hauled by No. 334, with No. 86 as pilot, being composed of ten bogies and six-wheel brake (including a diner)."

Bridge Reconstruction at Preston, L.M.S.R.

THE reconstruction of the bridge spanning the River Ribble south of the East Lancashire side of Preston station has given

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rise to some interesting workings, as will be seen from the following notes sent by Mr. L. C. King-Wilkinson:—"The west, or down-stream, side of the bridge has been taken in hand first, traffic into and out of the East Lancashire side of Preston station being worked over a single line. A facing crossover has been laid down as a temporary measure just south of the bridge, so that no setting-back is involved for trains entering the station and which cross the bridge on the wrong line with little or no delay. One or two of the week-day trains to and from Blackburn and East Lancashire which do not include a Preston Junction stop in their schedules have been diverted *via* Lostock Hall and are dealt with on the west side of Preston station at platforms 1 and 2; otherwise week-day business is as usual. On Sundays the bridge is handed over entirely to the engineers, while the East Lancashire side of Preston station and the Butler Street entrance are closed. Preston Junction station is also closed, and Blackburn trains run *via* Lostock Hall. All Liverpool trains miss Preston Junction and Lostock Hall, taking the route generally followed by expresses to Liverpool to their first stop at Midge Hall.

"It is, however, by the Sunday trains to Southport that the most circuitous of routes must needs be followed. Leaving Preston, these first proceed *via* the Farington Curve to Lostock Hall, which station they are to serve presumably to compensate for the diverted Liverpool trains. Thence running through Preston Junction, but without calling, they traverse the spur from Whitehouse South to Whitehouse West Junction, at which latter point they rejoin their normal route. For this five-mile detour to reach a point less than a mile from their starting-point, coupled with an extra stop—at Lostock Hall—there is an average allowance of eleven minutes. The peculiar 3.35 p.m. Preston to Liverpool *via* Meols Cop (Southport) train continues to run, as also the corresponding 2.10 p.m. Liverpool to Preston, but ceases temporarily to take the Glasgow-Liverpool coaches which are attached to the 3.40 p.m. train to Liverpool *via* Midge Hall."

Compensating for Traffic Delay.

RAILWAY companies are sometimes charged with lack of consideration for passengers whose subsequent arrangements may be upset because of the late running of a particular train, a missed connection, or some other unusual complication, though we have come across a good many instances where considerable trouble was taken to minimise inconvenience to passengers. Thus we have known a principal express stopped specially at a junction near London so that passengers who would have to use local trains after reaching the terminus could join them there and thus get trains which would have left by the time the terminus was reached. As this occurred in the late evening it was a valuable facility, while the additional two or three minutes' lateness of the express at the terminus would not make very much difference to passengers having to proceed to parts of London not served by the railway in question. On another occasion we noted a case where, a main line train being late and a stopping train usually behind it from a junction station having been sent on, a special was made up to run as far as necessary for passengers who would thus have lost their connection onwards.

Mr. Gerald W. Spink sends some notes as to a further instance of forethought under circumstances of the same kind. He writes:—

"On February 14 the 'Queen of Scots' express for Edinburgh left Newcastle half an hour late owing to fog delays south of Darlington. Owing to this delay the train ran into signals north of Berwick which did not allow time to be made up. Nevertheless, there was some noteworthy running as far as Berwick-on-Tweed, which was passed in 74 minutes instead of 77, despite slacks south and north of Morpeth in addition to the compulsory slack through that station. The engine was the Gresley Pacific *Bayardo*. As the train is nominally due in Waverley at 7.35 p.m., it was my intention to catch the 7.57 to Alloa. Before leaving Newcastle I duly requested that the connection might be kept, and was informed that the Waverley authorities would be advised. Indeed, all passengers on the Pullman were invited to state if they were travelling beyond Edinburgh, so that some arrangement might be made. On arrival at Waverley I found that the 7.57 had been despatched, but I was evidently expected, as I was welcomed by the guard of the 8.10 p.m. Dundee semi-express, who told me that I was to travel by this train as far as Inverkeithing, where a special stop would be made. The Alloa-Stirling train was waiting here beyond the platform on the Inverkeithing-Dunfermline section of the line, and as soon as the Dundee train had cleared the junction, the Stirling train backed in to give me my connection. By the time Alloa was reached we had made up the delay almost entirely. The whole arrangement was a

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sensible example of good organisation, far better than keeping back the Stirling train until the arrival of the 'Queen of Scots,' which would have held up passengers between Waverley and Inverkeithing, and possibly have caused more serious delay to the Dundee train than was occasioned by its brief stop. The overall time of under four hours probably constitutes a record timing between Newcastle and Alloa."

The A.B.A.C.

THESE initials denote the "Association Belge des Amateurs de Chemin de Fer," formed at the beginning of the year. Its aims and objects are clearly indicated by the following statement:—

(1) To gather together all persons interested in the organisation and exploitation of railways, in order to allow them to utilise and develop mutually their respective knowledge concerning this method of transport, from the scientific, practical, economic, and æsthetic points of view.

(2) To foster the study of such improvements as may be desirable in railway exploitation, notably concerning artistic works, track material and rolling-stock, the safety of the passengers and goods conveyed, the increase of comfort and conveniences in passenger coaches, the intensity of traffic, and the development of touring. For this purpose it organises courses, lectures, conferences, lantern-slide and cinematograph exhibitions, outings, excursions, and journeys for study purposes, competitions, and exhibitions of collections, sketches, and models.

(3) For the purpose of research, study and experiment, and on the example of similar groups in other countries, notably those of the United States, the British Empire, France, Japan, Germany, Holland and Czecho-Slovakia, it promotes and develops amongst enthusiasts and young students the construction of reduced scale models of railways, and helps them in the establishment of small railway systems which both from the point of view of the arrangement of the tracks, the functioning and locking of the points, the signalling apparatus, the formation and the composition of the trains, &c., constitute a faithful representation of the big lines. To this end, its programme also includes the encouragement of the industry relating to this branch.

"As soon as it is in a position to do so, the Association will constitute for the use of the members a library of technical and historical works and periodical publications dealing with the various points of its programme. If possible, it will also publish a bulletin dealing with these questions. The Board of Directors will also examine the possibility of affiliating the members to a touring organisation, with a view to procuring advantages and facilities for journeys for study purposes.

"The Association comprises active members and patrons. The 1930 subscription of active members has been fixed at Frs. 25. The minimum payment to be made by patron members is Frs. 125 per annum. They may in addition make gifts for the development of the Association.

"Supporters should write to the Association's offices, rue des Palais, 314bis, Brussels, and subscriptions should be paid to the postal cheque account of the Association, No. 281,272. A meeting of new supporters will be called shortly with a view to the organisation of local sections."

Mr. J. De Volder is General Secretary, and Mr. Henri Bockstael, Chairman.

The World's Longest Railway Tunnels.

IN view of the recent issue of the Channel Tunnel Report, the following particulars, collected from various sources, and particularly from C. J. Allen's "The Railways of To-day," will be of interest:—

		Miles.	
Simplon ..	..	12·3	Switzerland-Italy
Appennine ..	..	11·5	Italy.
St. Gothard..	..	9·3	Switzerland
Lötschberg ..	..	9·1	,,
Mt. Cenis ..	..	8·0	France-Italy.
Cascade ..	(new)	7·8	U.S.A.
	(old)	4·0	
Arlberg ..	..	6·4	Austria.
Moffat ..	..	6·1	U.S.A.
Tauern ..	..	5·5	Austria.
Ricken ..	..	5·3	Switzerland.
Grenchenburg	..	5·3	,,
Otira ..	..	5·3	New Zealand.
Hauenstein	..	5·1	Switzerland.
Somport ..	..	5·0	France-Spain.
Connaught (Rogers Pass)		5·0	Canada.
Monte Orso	..	4·7	Italy.
Hoosac ..	..	4·7	U.S.A.
Monte Adone	..	4·5	Italy.
Severn ..	..	4·4	England.
Jungfraujoch	..	4·3	Switzerland.

There are also the Shimizu tunnel (9½ miles) and the Tanna tunnel (5 miles) under construction in Japan.

The Severn is the longest *under-water* tunnel.

L.N.E.R. Traffic Observation.

MR. R. A. H. WEIGHT sends the following notes:—

"When it is necessary to transfer electric rolling stock belonging to the Great Northern and City section of the Metropolitan Railway to Neasden Works, the vehicles are worked by a G.N. section 0-6-2T locomotive from Drayton Park incline, *via* the goods line to Holloway, and thence *via* York Road and the widened lines to Aldersgate Street; here a Met. locomotive takes them over and hauls

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them *via* Baker Street. Similar arrangements apply in the reverse direction when necessary. When travelling in the care of a L.N.E. engine, these cars are not braked, so that slow speed is essential. A goods-guard's brake-van is attached in rear.

"The Finchley-Edgware rail-car now varies its passenger-carrying itinerary on week-days (Saturdays excepted) by running a trip from Finchley to High Barnet and back at mid-day—meanwhile a tank engine takes a passenger train on the Edgware branch, and does any necessary placing of wagons before returning. On concluding the day's work, instead of running empty, the rail-car works as a passenger train from Church End to Finsbury Park, thus filling a gap before the last up High Barnet service, and providing a connection from Edgware and intermediate stations, *via* Finsbury Park, to the last New Barnet and Enfield line down suburban trains.

"Most of the outer-suburban and other stopping or fast business trains to and from King's Cross, Hitchin, Cambridge, etc., have been greatly improved in appearance and carrying capacity by the introduction of a number of comfortably appointed sets of twin-bodied coaches, which have been put into regular daily or two-daily workings.

"The fireman upon Atlantic No. 4419, which was working the down West Riding Pullman on March 8, was taken ill on the journey, and driver Barnes decided to stop at Peterborough, where the fireman off the 'pilot' Atlantic was requisitioned. A delay of only four minutes was occasioned, and this deficit was wiped out, Leeds being reached to time. As the sick man was found to be suffering from appendicitis, the driver's action was undoubtedly commendable. With a further strange fireman—a Leeds man—on the return journey, with the up Sunday 7-car Pullman, driver Barnes on his unique booster-fitted express engine lost fifteen minutes by single-line working and engineering delays, but reached King's Cross only three minutes late, having averaged well over 60 m.p.h. from beyond Wakefield.

"In connection with the International Rugby match at Twickenham on March 15 six special trains from Scotland and the Border Country were run to King's Cross, Newcastle engines coming through on each. These included the new Pacific No. 2595 *Trigo*, which is the first of the eight standard high-pressure 4-6-2 locomotives which were ordered last year to complete the establishment of 70 Gresley Pacifics, and which will be stationed in the N.E. and Scottish areas. Their numbers will be 2595-9 and 2795-7; built at Doncaster works.

"When semaphores are due for renewal, or further signals are required, upper quadrant arms are being fitted in various parts of the L.N.E. system. Interesting examples of this new development are to be seen south of Wood Green, on the G.N. main-line, in the form of the additional signals covering the connection from the up carriage line to the newly extended carriage sidings; and also the fast and slow line advanced starting signals from Wood Green No. 4 Box, which have beneath them on the same posts Hornsey distant arms. Owing to the opening of a new road over-bridge and the consequent abandonment of the level-crossing at Muskham, near Newark, the signal-box of that name has been done away with. A new box, controlling similar signals and a level crossing, has been opened about 280 yds. north of the Muskham site, and is called Bathley Lane."

New Station at Bristol, G.W.R.

THE main details of the G.W.R. Company's new station at Bristol Temple Meads have now been settled, and work has already commenced. The station, when completed, will become one of the finest in the country and the layout will, in addition to permitting of longer trains being dealt with, greatly facilitate the working through Bristol of trains to and from all parts of the country. The scheme will include the quadrupling of the line between South Wales Junction and Portishead Junction. The suburban stations of Bedminster and Parson Street will be rebuilt. The total cost of the whole scheme will be about £1,250,000. The new Temple Meads station will occupy an area of nearly three times that of the existing station, and will extend on the east side to the boundary of the cattle market. There will be 15 platforms instead of nine as at present.

"THE WHY AND THE WHEREFORE" SECTION IS UNAVOIDABLY HELD OVER THIS MONTH.

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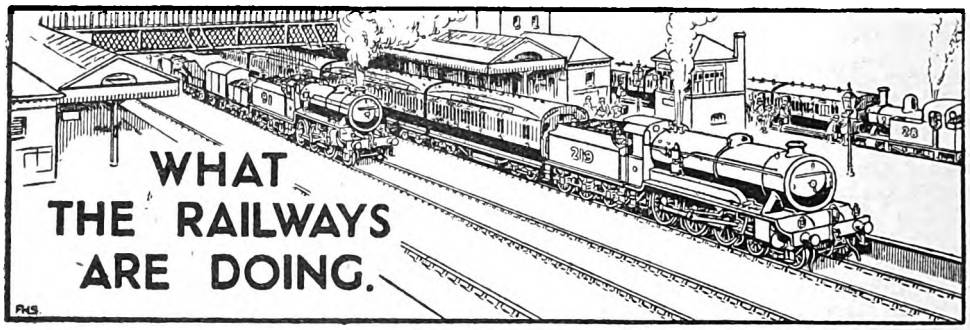

L.N.E.R. Continental Traffic Organisation.

We are officially informed that the L.N.E.R., in consequence of the recent death of Mr. H. Allaway, who was Assistant General Manager (Shipping) and Continental Traffic Manager (North), have appointed Mr. A. L. Gibson, Continental Traffic Manager (South), to be Continental Traffic Manager to the company. The company has also appointed Mr. J. H. Smith, at present Assistant to the Continental Traffic Manager (South), as Assistant to the Continental Traffic Manager in respect of the Humber Services, with headquarters at Hull.

* * *

New L.N.E.R. Appointments.

We are officially informed that the following appointments have been made:—

Mr. H. W. C. Drury, District Superintendent, Norwich, to be District Superintendent, Stratford, in succession to the late Mr. F. G. Randall.

Mr. F. C. Wilson, Stationmaster at Liverpool Street, to be District Superintendent, Norwich, in succession to Mr. Drury.

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Mr. Thomas Henry Turner, M.Sc., A.R.Ae.S.I., M.Inst.Met., who has been appointed Chief Chemist and Metallurgist, L.N.E.R., with headquarters at Doncaster, was born in Stafford in 1895, and is a son of Emeritus Professor Thomas Turner, M.Sc., A.R.S.M., F.I.C., formerly Director of Technical Instruction for Staffordshire. He was educated at King Edward's High School, Birmingham, and in the University of Birmingham, where he obtained the Wiggin Scholarship. He then travelled on the Continent. From 1914 to 1918 he was interned in Heidelberg, Berlin, and Ruhleben Camp, incidentally obtaining a useful knowledge of technical German during this period. He took his degree of B.Sc. in Metallurgy at the University of Birmingham in 1920, and M.Sc. in 1922. After leaving the university he worked for a period as a "college apprentice" at the Metropolitan-Vickers Electrical Company's works at Trafford Park, Manchester, then serving as Metallurgist in the Research Department of that firm. In 1924 he was appointed Lecturer in Metallurgy at Birmingham University, a position which he still occupies. From 1922 to 1926 he obtained consulting experience in collaboration with his father, Professor Turner. He has, at various periods, visited industrial establishments in Germany, France, Switzerland, U.S.A., and Canada, and has attended metallurgical conferences, as well as undertaking original research and contributing papers on strain in steel, corrosion prevention, alloys, &c.

Mr. T. H. Turner, M.Sc.,
Appointed Chief Chemist and Metallurgist, Doncaster, L.N.E.R.

* * *

Mr. P. Marriott Payne, F.S.I., A.M.Inst.C.E., has retired from the position of Rating Surveyor, L.M.S.R., and the directors have appointed Mr. H. J. Burcham, Divisional Rating Agent, Euston, to succeed him. Mr. Burcham's office will be at Euston.

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WE regret to record the death of Mr. F. C. Bingham, for many years a well-known member of the staff of the Metropolitan District Railway. He entered District Railway service in 1887, retiring on September 30, 1924. Before joining Metropolitan District service Mr. Bingham was, for some eleven years, attached to the headquarters staff of the Midland Railway at Derby. For many years he represented the Metropolitan District Company at the Railway Clearing House. The funeral, on March 1, at Hither Green Cemetery, was preceded by a service in Lewisham Congregational Church.

* * *

THE fitting of the vacuum brake to G.E. Section L.N.E.R. passenger stock is proceeding rapidly, and the vacuum brake is now operated on nearly all the trains working over the Cambridge main line, between Liverpool Street, Norwich, Yarmouth (Vauxhall) and Lowestoft, and all trains north of March. The trains working from and to Liverpool Street over the Colchester main line to Cromer, Yarmouth (South Town) and Lowestoft Central (*via* Ipswich) are now being dealt with, and shortly the vacuum brake will be operated on 17 trains in each direction ; other trains will be added as the brake alterations are carried out, and by July the vacuum brake will be operated on the majority of these trains.

* * *

AMONG the exhibitors in the British Section of the Antwerp Exhibition, April-October, will be the Port of London Authority, the Mersey Docks and Harbour Board, the Tyne Improvement Commissioners, Goole Harbour, the Aire & Calder Navigation, Harland & Wolff, the Travel Association of Great Britain, the London & North Eastern Railway, the London Midland & Scottish Railway, and the Southern Railway, while the shipping companies will include the White Star, Cunard, Union Castle, Furness Withy, Clan, and Elder Dempster lines.

* * *

THE Metropolitan-Vickers-GRS, Limited, have received a contract from the London Midland & Scottish Railway Company for the supply and installation of 201 colour light signals, 128 train stops, 312 condenser-fed track circuits, approximately 700 A.C. relays, cabin equipment for 11 cabins, including 198 A.C. combined lever locks and circuit controllers, 86 time releases, seven illuminated diagrams, together with necessary transformers, cabin indicators, route indicators, point detectors, &c. These are for use on the Camden-Watford electric route.

THE annual five miles cross-country race of The Railways Athletic Association was held on Saturday, March 15, from the Royal Air Force Record Office, Ruislip. The event attracted 225 entrants, and the majority of these lined up before Lieut.-Col. F. A. Cortez Leigh, Electrical Engineer, L.M.S.R., who acted as starter. The awards were presented to the recipients by Mrs. Cortez Leigh. Among those present were Mr. W. G. Pape, O.B.E. (Southern Railway), and Mr. W. J. Blake (L.M.S.R.).

* * *

THE large and varied stock of special wagons owned by the London & North Eastern Railway Company has recently been augmented by the addition of four trestle plate wagons, each of a carrying capacity of 30 tons. The plates rest in the well, and are supported by the steel trestle, which forms an integral part of the wagon. Plates up to 40 ft. long by 13 ft. 6 in. wide can be carried in this way. The principal dimensions of the wagon are as follows:—Length over headstocks, 60 ft.; centres of bogies, 50 ft. ; width over side girders, 7 ft. 9 in. ; height overall, 10 ft. 6 in. ; tare, 25 tons 15 cwt.

* * *

THE Westinghouse Brake & Saxby Signal Co. Ltd. have received an order from the London Midland & Scottish Railway for the supply and installation of a complete power signalling plant at St. Enoch's station, Glasgow. Included in this contract will be the following material:—1 227-lever all-electric interlocking frame, having no mechanical locking ; 1 illuminated diagram ; 53 main 3-aspect colour-light signals with posts, ladders, fittings, &c.; 99 shunt and call-on signals ; 26 route indicators ; 106 power-operated point layouts ; 128 A.C. condenser-fed track circuits ; 450 (approx.) A.C. relays.

* * *

A FURTHER 50 covered containers and 25 insulated containers for the conveyance of meat and other perishable traffic are to be ordered by the Great Western Railway. Last year the company recorded an increase of 211 per cent. in tonnage carried in containers over 1928. The company now have 518 in daily use.

* * *

AT the meeting of the Executive Council of the Canadian Chamber of Commerce in Great Britain, on February 12, Mr. C. J. Smith, European Vice-President of the Canadian National Railways, was elected President, succeeding Mr. Henry Ridpath.

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THE Great Western Railway is placing orders for two hundred thousand Canadian Douglas fir sleepers mainly for use in connection with Government work schemes mentioned under the Development Act, 1929.

* * *

RECENT orders for Thornycroft motor vehicles include a further contract from the Great Western Railway for 23 4-ton and 20 30-cwt. freight chassis, which increase the orders received during this year from the G.W.R. for Thornycroft chassis to a total of 274. These have comprised a wide range of 30-cwt. to 10-ton freight chassis and several types of passenger chassis.

* * *

THE Great Northern Railway of Ireland is opening a central booking office, cloak-room and waiting-room at No. 2, Lower O'Connell Street, Dublin. It is intended that the premises shall be available for the conveyance of passengers by the company's rail and omnibus services. Not only can passengers purchase their tickets in advance, but they can use the offices for the purposes of a cloak-room when shopping in town.

* * *

A NEW office is to be constructed at Ipswich, L.N.E.R., to deal with inward and outward parcels traffics and a separate store for fish traffic. In the booking-hall, alterations will be carried out which will give better access to the platform. Improved office accommodation is being provided for the District Manager and his staff, and also for the stationmaster.

* * *

"SWITZERLAND THIS SUMMER" is the arresting "note" on a new picture poster just issued by the Southern Railway, in calling attention to their Continental services. The poster depicts a typical forest and mountain scene in Switzerland, and is a pleasing combination of black, light blue, grey and white. Smaller posters, also relating to the company's Continental services, include one (similar in colouring to that mentioned above) labelled "Vichy"; and a second—with a dash of red in it instead of blue—entitled "Come Abroad with Us." Both show groups of figures at open-air resorts. Particularly bright as to colouring is the fourth poster of the series. This bears the caption, "The Link of Nations," and shows the Union Jack flying above the words "Southern Railway," with the colours of other nations well in evidence.

* * *

THE London & North Eastern Railway has placed the following orders:—Two suburban trains, each consisting of two quintuple sets and carriages, and 32 third-class bogie vestibuled carriages with the Metropolitan-Cammell, Carriage Wagon & Finance Co., Ltd.; 8 first-class bogie vestibuled carriages and 6 composite vestibuled carriages with Cravens Railway Carriage & Wagon Co., Ltd.; and 7 brake third-class bogie vestibuled carriages, 3 compartments, and 14 brake third-class bogie vestibuled carriages, 4 compartments and 2 brake composite vestibuled carriages with the Birmingham Railway Carriage & Wagon Co., Ltd. The vestibuled carriages are for the York, Perth and Edinburgh, Edinburgh and Glasgow, and Glasgow-Aberdeen services, and the quintuple sets for suburban services on the Great Eastern section.

* * *

PRINCESS MARY, the Earl of Harewood, and the civic heads of eight Yorkshire cities and boroughs, joined with a vast audience of railwaymen and their wives on Saturday, March 22, in attending the concert of the London & North Eastern Railway Musical Society in Leeds Town Hall. As she took her place in the Festival Gallery, H.R.H. received a bouquet of flowers from Miss Nina Gracie, daughter of Mr. D. M. Gracie, of Leeds, District Superintendent of the L.N.E.R. As the Chairman of the L.N.E.R. and President of the Musical Society, Mr. William Whitelaw emphasised, in thanking Princess Mary and the Earl of Harewood for their presence, that the gathering on Saturday was a family one. At least 90 per cent. of the audience which packed the Victoria Hall were railwaymen or their wives, and the choir and orchestra who gave the concert were drawn from all ranks of the railway service, drivers, porters, guards, signalmen, clerks and cleaners. The orchestra, numbering 100 players, travelled from London by special train for the concert, and the male voice chorus of 320 were drawn from Cambridge, Doncaster, Ipswich, Lincoln, London, Norwich, Peterborough, York, and other places. Mr. Edgar Wilby conducted the orchestra, and Mr. Leslie Woodgate, the choir.

* * *

ON Saturday, March 15, the Queen's Hall was filled with an enthusiastic audience assembled for the eighth annual Bohemian Concert of the Metropolitan Railway Athletic Association. The chair was occupied by Mr. W. Holt, as Chairman of the Association, Mr. Holt being also the well-known Traffic Manager of the Metropolitan Railway. He was supported by some of the directors and practically

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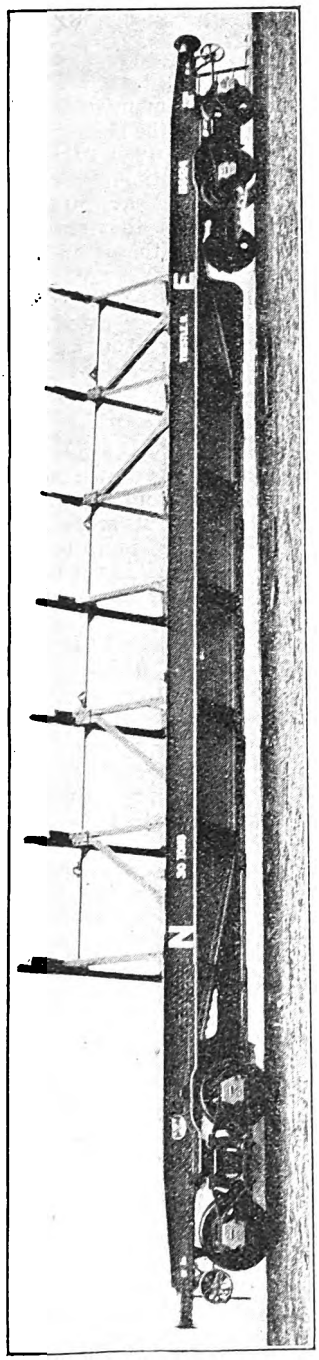

NEW 30-TON TRESTLE PLATE WAGON, L.N.E.R.

all of the chief and leading officers of the Metropolitan Railway, together with a large number of visitors, including the following:—Sir E. Manville, Director, Metropolitan Railway; Mr. B. D. F. Docker, Director, Metropolitan Railway Country Estates; Mr. H. S. Chapman, Secretary; Mr. J. Wardle, Commercial Manager; Mr. E. A. Wilson, Engineer; Mr. W. M. Ballingall, Accountant; Mr. E. Sutton, Stores Superintendent; Mr. C. W. Clark, Architect, Metropolitan Railway; Mr. R. H. Nicholls, Superintendent of the Line; Mr. R. Cope, Accountant; Mr. H. R. Campfield, London Divisional Superintendent, G.W.R.; Mr. J. McLaren, Secretary; Mr. I. B. Pritchard, Chief Legal Adviser; Mr. M. D. Robinson, District Locomotive Superintendent, Neasden, L.N.E.R.; Mr. A. Newlands, Chief Engineer, L.M.S.R.; Mr. A. L. Barber, Commercial Manager, and Mr. C. S. Louch, Comptroller and Accountant, Underground Railways, &c.; Sir A. Wyon, Price, Waterhouse & Co.; Mr. A. W. Arthurton, British Railways Press Bureau; Mr. M. Griffiths, Westinghouse Brake & Saxby Signal Co. Ltd.

* * *

THE Tenth Amateur Championships of the Boxing Section of the L.N.E.R., G.E.A.A., were competed for in the presence of a large gathering of members and friends at the Stadium Club, High Holborn, on March 18. At the close of the evening, Lady Wedgwood presented the cups, badges and medals. The championship cup was won by the Southern Area, and was received by Colonel H. H. Mauldin, Superintendent, Eastern Section, Southern Area, and Chairman of the Association. Among those present were Sir Ralph Wedgwood, C.B., Chief General Manager, L.N.E.R., and Lady Wedgwood; Mr. G. F. Thurston, Divisional General Manager; Mr. L. Sydney Smith, Hotels Manager; Mr. C. H. Newton, Chief Accountant; Mr. Percy Syder, City Manager; Mr. C. W. L. Glaze, then Mechanical Engineer, Stratford; and Mr. E. Thompson, now Mechanical Engineer, Stratford.

* * *

THE L.M.S.R. are widening the line at Mirfield for three-quarters of a mile, this including the widening, to accommodate two additional main lines, of the viaduct over the river Calder, and the provision of a group of sidings to the east of Mirfield station.

* * *

THE midday train service on the Central London Railway has been increased by three trains an hour between Liverpool Street and Marble Arch. This brings the total to 37 trains an hour in each direction, equivalent to one every 95 seconds, and represents the most frequent train service that has ever been operated in any tube line in London.

* * *

FOLLOWING some interesting notes on the new Wimbledon and Sutton line, S.R., Mr. C. R. Moody, after mentioning the many cases where Holborn Viaduct-Sutton trains actually work through to Victoria, etc., points out that as a result of these new services the distribution of the electrical stock has been mate-

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rially altered. Sets formerly confined to Central Section services are now working on Eastern Section services and vice versa. In this connection he gives the following approximate analysis of Southern Electric stock:—

1200–1300 series:	Original converted L.S.W. stock
	Steel-panelled S.R. stock for Guildford services, 1925.
1400–1500 ,,	Converted S.E. & C. stock, 1925–6.
	S.R. steel-panelled stock, 1925–6.
1600–1629 ,,	Converted S.E. & C. stock, 1928.
1630–1659 ,,	Converted L.B. & S.C. stock 1928.
1660–1699 ,,	Converted L.S.W. stock 1928.
1700 onwards	Converted L.B. & S.C. stock, 1928-9-30.
1900 series	Converted side-corridor stock, ex L.B. & S.C., 1929.

The converted L.B. & S.C. stock includes 7 coach bogie sets, "C.P." and "C.W." A.C. electric rolling stock. The latest new trains are Nos. 1757 and 1758, both constructed from "B" section vehicles. The trailer sets include: Two 8-compartment L. & S.W. vehicles (close coupled); 2 L.B. & S.C. 9-compartment 3rds (loose coupled); 1 8-compartment S.E. & C. 3rd, close coupled to an 11-compartment 3rd, converted apparently from L. & S.W. stock. The latest trailer sets are of L.B. & S.C. pattern.

* * *

PICTURESQUE ceremonies marked the observance of the hundredth year of service of Carrollton Viaduct, spanning Gwynn's Falls, Baltimore, Maryland, U.S.A., which was built in 1829, and claimed to be the oldest railway bridge in the United States. The proceedings included a pageant, with a replica of an original train with passengers dressed according to the period. The bridge is on part of the original Baltimore & Ohio line.

* * *

THE earliest examples of the "2251" class of new 0-6-0 "mixed traffic" engines on the G.W.R. are already being put into service. No. 2253 was noticed at Bath on April 4. The design is singularly neat and pleasing in appearance; and it is gratifying to note that the standard Great Western green is retained. The chimneys are copper-capped. These are the first 0-6-0 engines with coned domeless boilers and Belpaire fireboxes.

* * *

Two Bournemouth readers give the following S.R. information:—Adams 0-4-2 engines scrapped, Nos. E529, 538, 542, 547, 548, 552, 553, 576. Deflecting screens fitted to 4-6-0's, Nos. E331, 332, 474, 477, 522, 483-4-5-7-8-9, 495, 501-2-6-7, 827-3-5-9, 831-2, 850-1-2, 862-3-4. Goods engines painted green, E498, 501-2-3-5-6-9, 512, 515, 823-5-7-8, 831-2.

* * *

"8280" mentions that many new J.39 0-6-0's are now working on the G.E. section of the L.N.E.R.—Nos. 1265-1269, 2711-2730 and 2771-2777, while "Sentinel" locomotive No. 198 is shunting at Stratford Works. He also points out that cast-iron chimneys have been fitted to some of the 1900 and 1500 classes, though No. 8836 has a G.N. pattern chimney. 4-6-0's Nos. 8519, 8533 and 8540 have been fitted with Lentz valves. Our correspondent asks for particulars of 2-4-0's and 0.6-0's (J.15 class) recently scrapped.

* * *

MR. E. M. SANDERS sends the following train service query:—What town which forms the terminus of through carriages from London by the shortest route three times a day is, nevertheless, more quickly reached from London by making a detour involving nearly 30 miles extra travelling at the expense of one change of carriages and the completion of the last 40 miles of the journey by a stopping train? It is necessary to explain that this would not apply in summer, when the running of a holiday express removes the anomaly.

* * *

ON page 81 of the January number a quotation from *The Transport Observer* suggested that the change of steam and electric locomotives at Rickmansworth, was allowed seven minutes. We understand, however, that the real time is two minutes, seven minutes being allowed between the Chorley Wood and Rickmansworth departures on trains which involve a change of locomotives, as compared with five minutes for Marylebone steam trains, for which this operation is not, of course, required. We are obliged to Mr. A. E. Cable and other readers who have pointed this out.

* * *

WRITING from Calcutta, Mr. E. G. de Cunha suggests that the railway station at Penang is unique, in that no trains depart or arrive there, although all other business in connection with a railway station is transacted. The explanation is, of course, that the railway runs only to Prai, and that passengers, luggage, goods, &c., have to be transported across the bay. We would point out, however, that such

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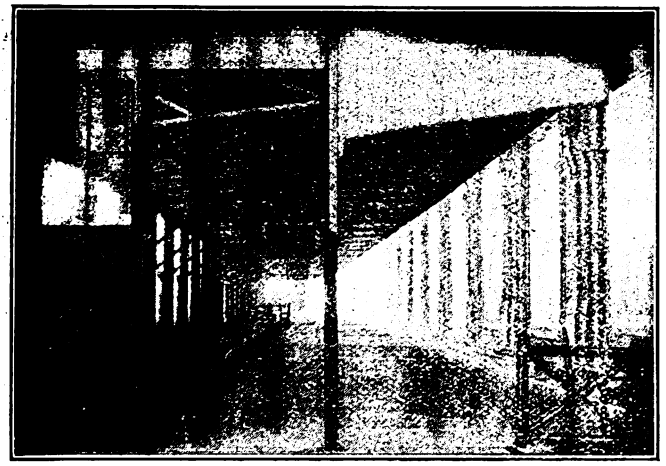

[*V. W. Orford.*

NEW INNER SHELTER RECENTLY ERECTED OVER CONTINENTAL ARRIVAL PLATFORM (No. 8) AT VICTORIA STATION, LONDON, SOUTHERN RAILWAY.

an arrangement is not unique. It occurs, for instance, in the British Isles, at Dartmouth, which has its own railway station, though steamer transit is necessary to connect with trains on the south side of the river at Kingswear.

* * *

MR. ERIC R. BIRKETT, of Edinburgh, writes:—"Mr. George S. Duncan asks if any important express train in Britain stops only two minutes at intermediate stations. There are one or two that might be mentioned, but he may be particularly referred to the 10.50 p.m. 'Sleeper' from Waverley to King's Cross, due to reach Berwick at 12.2 a.m., and to leave at 12.3 a.m. Certain other important trains also have intermediate stops of one minute's duration."

* * *

"AJAX" calls to mind that among the oldest engines in the country was S. & D.J.R. 2-4-0T No. 28A. This engine was built as a 2-4-0 for the Somerset Central Railway in 1861 by Messrs. George England & Co. It was afterwards rebuilt at Highbridge as a tank engine, and was broken up in 1928 after 67 years' service.

* * *

MR. P. J. R. WRIGHT submits another puzzle query: Between what two large towns more than 200 miles apart is it possible to travel on week-days by two trains leaving and arriving at the same station in both towns within three-quarters of an hour of each other, and following entirely different routes except for 40 miles of the journey?

ON March 12, Mr. C. G. Dandridge, Advertising Manager, L.N.E.R., read a paper on "Modern Advertising" at a meeting of the L.N.E.R. (London) Lecture and Debating Society.

* * *

THE new G.W.R. steamer *St. Patrick* is now working on the Weymouth-Channel Islands route.

* * *

COMMENTING upon Mr. A. Ransom Cowlishaw's remarks in the April number, as to S.D.J.R. coach seen at Clapham Junction, Mr. M. F. Yarwood writes:—"Since the parent companies of the S.D.J.R. took over the maintenance of the line, the rolling stock has been divided between them, and by observation it appears that the L.M.S. have taken the goods and the S.R. the passenger stock. The company to which any one coach belongs can be discovered by an 'L.M.S.' or 'S.R.' stencilled in white, on the bottom right-hand corner of the coach body. The same also holds good for the goods stock. At this town (Gillingham) S.D.J. vans are frequently included in the milk trains to Clapham and Forest Hill, but only since February. Thus the stock is working as ordinary S.R. vehicles, and will doubtless be repainted in time in the owners' livery and used for milk traffic."

* * *

IN view of the approaching Centenary celebrations of the Liverpool and Manchester Railway, Mr. W. E. S. Brown points out that "Liverpool applies also in connection with railway electrification, in that the Liverpool Overhead was the first overhead electric railway in the world and that the Liverpool-Southport route was the first instance of the equipment of a steam line for electric traction, though, in the latter case, Liverpool can only claim this distinction by a very 'short head,' in view of the practically contemporaneous equipment of the Tynemouth line of the North Eastern Railway in Newcastle."

* * *

MR. CECIL M. FURST mentions that among the new L.N.E.R. locomotives observed by him and now in service are 4-6-2's Nos. 2595, *Trigo*, and 2596, *Manna*. He explains that the latter engine takes

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the name formerly borne by No. 2553, renamed *Prince of Wales*. He directs attention also to the new pattern of tender, generally similar to those fitted with side corridors, but not of corridor type, and the glass windscreens fitted on the sides of the cab. In connection with the England *v.* Scotland Rugby match at Twickenham, one of the special trains from Edinburgh served various stations on the suburban line before proceeding south.

* * *

MR. J. R. HOLLICK mentions that some of the Midland "1600" class shunting tank engines are now being rebuilt with Belpaire fireboxes, though they retain the old type of cab. He recently noted at Derby a Johnson 4-4-0, No. 311, practically in its original condition.

* * *

MR. K. R. VASEY mentions that the G.W.R. 0-4-0T No. 96 illustrated and described in the April number, has been stationed at the Stafford Road sheds, Wolverhampton, for some time. He also mentions that 4-6-0 No. 4024, *Dutch Monarch*, appears to have a "Castle" type boiler, though it retains its old-type cab.

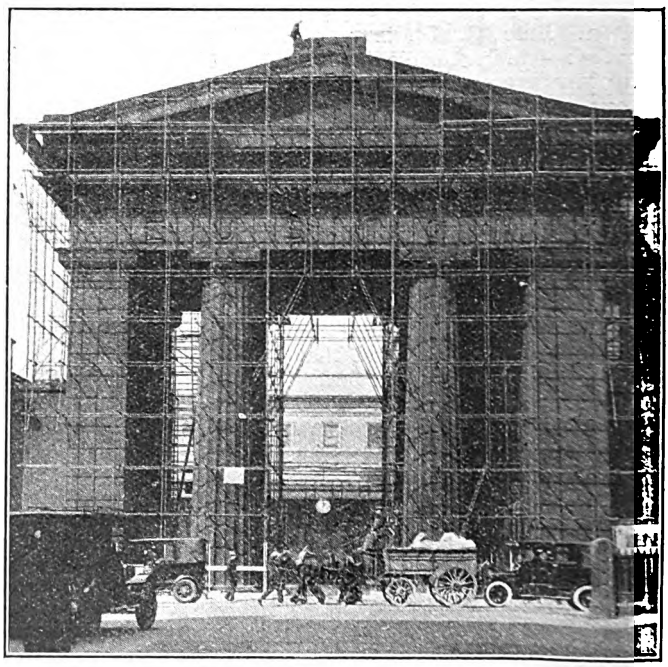
* * *

MR. N. J. PALMER, of Johannesburg, mentions that a 2-4-0T, built in 1907 for the Jersey Railway, is now working at Vereeniging, in the Transvaal, as the property of the Victoria Falls and Transvaal Power Company, for hauling coal to the power station. The engine has been in South Africa for about two years, but still bears the name *La Maye*, with the number 5. It retains its original green painting, the only alteration since arrival being the substitution of central buffer couplings for side buffers.

* * *

MR. C. TAYLOR, of Cirencester, asks on what steam train starting from London it is possible to make a journey in the up direction, excluding, of course, circle and semi-circle services.

THE new 2-6-0 mixed traffic engines ex-Crewe are in service up to No. 13165. Of these, Nos. 13150-9 have been allocated to the Western Division (L. & N.W. section), and the remainder to the Central Division (L. & Y. section). Five 2-6-2 passenger tank engines of new standard design have been delivered from the Derby works, Nos. 15500-4. These engines are painted black with red lines and bear the classification 3P. 4-6-0 "Claughton" class engine No. 5979 has been fitted with a standard boiler, and with cab adapted for the Midland gauge. Previously it carried a boiler with mountings cut down for the Northern gauge. Engines recently adapted for working over the Midland Division include 4-4-0 "George V" class No. 5365 and 0-8-0 "G1" class Nos. 9152 and 9322. 0-8-0 "D" class mineral engines Nos. 9049 and 9063 have been converted to "G1" class (superheater). The former has also been altered from steam to vacuum brake. Engines recently withdrawn from service include the following:—5 ft. 6 in. 2-4-2 passenger tanks Nos. 6724, 6752; 4 ft. 6 in. 2-4-2 passenger tank No. 6581; 4 ft. 3 in. 0-6-0 coal class Nos. 8235, 8306; 0-8-0 "C1" class No. 8982; and ex-N.S.R. 0-6-0 class "E" No. 8659.



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THE DORIC ARCH AT EUSTON STATION, L.M.S.R., IN PROCESS OF BEING RENOVATED.

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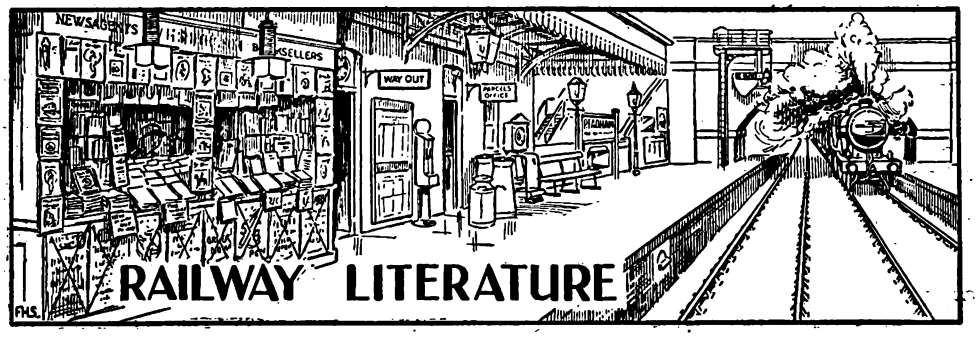

THE RAILWAY YEAR BOOK, 1930. Thirty-third Annual Edition. [The Railway Publishing Co. Ltd., 33, Tothill Street, Westminster, London, S.W.1. Price 5s. net, by post 5s. 6d. Ready early in May.]

Although the present volume, the Thirty-third Annual Edition, corresponds in general with its immediate predecessors, it includes several improvements and various new features. A new type is adopted for the principal headings, and many of the sections have been the subject of close revision, with additional entries, &c. This applies particularly to the European section, which, by the co-operation of correspondents, now includes essentially up-to-date statistics concerning railways in certain countries as to which reliable information is difficult to obtain. Particulars in regard to highest altitudes on world's railways have similarly been extensively revised and amplified. All standard information has been systematically revised, and includes full details of the extensive Southern Railway reorganisation which came into force on April 1 this year. Numerous new biographies have been added to the "Who's Who" section, and the Railway Bibliography includes many additions to last year's list. An important feature of *The Railway Year Book* is that each edition includes very complete statistical information in regard to the leading home railways as at the end of the year immediately preceding, in this case 1929. This information is further amplified this year by including the amounts for each railway involved by the Railway Freight Rebates Fund and the Railway Freight Rebates (Anticipation) Fund, this being one of the special developments of last year.

By the courtesy of the London Midland & Scottish and Southern Railways, we are able to give new maps of these systems revised to the end of 1929. A new map of the Midland & Great Northern Joint Railway is also given, while several other maps have been corrected in minor respects. A new table is given of the Largest Railway Station Platform lengths, which should be useful in view of the frequency with which questions are asked as to this point. The section on Largest Railway Stations in Great Britain has been revised in view of the fact that, besides Victoria (L.B.S.C. and S.E.C. Sections), the two London Bridge stations, also Victoria and Exchange stations in Manchester, are now operated as one station each. Several important additions have been made to the particulars of Associations, Institutions, &c., connected with railways, and in addition to careful revision of information as usually given, the office telephone numbers are now stated.

Among the new Associations may be mentioned the Railway Research Service, the Travel Association of Great Britain and Ireland and the Private Wagon Ownership Parliamentary Bureau, while particulars in regard to the Ministry of Transport have been considerably amplified. New branches of the Institution of Locomotive Engineers are set forth, and particulars of the leading model railway and other miscellaneous clubs and societies are now given for the first time. In the case of the Indian and Overseas (non-European) section, important changes have been made to meet altered conditions, especially in respect of Indian railways which have now been taken over by the State. In this connection, attention may be directed to the new map of India, which now includes also Ceylon, Siam and Malaya, and on which the various gauges are clearly differentiated.

THE LOCOMOTIVE ENGINEERS' POCKET BOOK, 1930. The Locomotive Publishing Co. Ltd. Price 3s. 6d.

This useful publication contains within convenient compass a large amount of locomotive engineering data, with a comprehensive series of articles dealing with various aspects. While it is sufficiently complete to meet the requirements of those engaged actively in locomotive engineering, a great deal of the subject matter

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will be found of use to students of locomotive practice and performance. The frontispiece illustrates one of the new 4-6-2 engines recently placed in service by the Bengal Nagpur Railway, India, while the contents include the chief dimensions of most of the principal locomotives now in service on British railways, with a number of overseas classes. Notes are given on a number of record locomotive performances and on tests which have been carried out at various periods, while the volume also includes standard engineering data and particulars of the principal mechanical officers of the various railways at home as well as abroad.

LONDON'S COUNTRYSIDE. Lovers of the countryside in general, and party promoters in particular, should secure a copy of the latest Metropolitan Railway publication, "A Day in the Country." It tells in picture and story of the charms of an unspoiled countryside that lies, so to speak, at London's elbow, and it also includes particulars of camping grounds and catering facilities, and a host of other information. Copies can be obtained free of charge from the Commercial Manager, Metropolitan Railway, Baker Street Station, London, N.W.1.

MR. BENJAMIN T. KING, of King's Patent Agency Limited, Wardrobe Chambers, 146A, Queen Victoria Street, London, E.C.4, sends a copy of the new edition of his handbook on Patents and Trade Marks.

MR. G. E. ORTON, General Agent, United States and Canada, for the Great Western and Southern Railways of England, 505, Fifth Avenue, New York City, sends a folder prepared for prospective American visitors to this country which constitutes an interesting companion to the tourist literature provided for use at home, with the injunction, "This year come to England—the Home of History." The cover shows a view of the Tower of London and the Tower Bridge. Inside there is a map showing the Great Western and Southern Railway systems, while on the various folds and around the map are a number of well-produced photographic views of places of interest served by the railways concerned. On one fold, following the advice, "Tour England first and then the Continent," particulars are given of the principal Continental services, also of railway communications with Ireland. We have also received a small folder, "England—the Gateway to Europe"—giving particulars of the various publications of the Great Western and Southern Railways and their American prices.

GRADIENTS OF THE LONDON AND NORTH EASTERN RAILWAY. By "Voyageur." [The Railway Publishing Co. Ltd., 33, Tothill Street, Westminster, London, S.W.1. Price 2s. net. By post, 2s. 2d. 48 pp., with cover and index. Art paper.]

This is a collection of the articles on the Gradients of the London and North Eastern Railway as published in THE RAILWAY MAGAZINE, January to June, 1929, revised and corrected to date, and now available in a convenient form for reference. Twenty-four pages are occupied by the gradient profiles, all drawn to the same scale, and with signs indicating the location of service slacks (distinguished as severe or moderate), water-troughs, tunnels and notable viaducts. The text includes general explanatory remarks, and complete tables of distances covering junctions as well as stations and signal-boxes at important timing points, summits, &c., and their position on the up or down side of the route. All main routes are given throughout, together with the secondary main lines and branch lines over which express trains are operated, this applying to all three areas, Southern, North-Eastern and Scottish, and including also the C.L.C. main line. In view of the wide appreciation of the publication of this material in the pages of THE RAILWAY MAGAZINE, this volume (with a few necessary revisions and corrections) will, no doubt, be appreciated not only by students of locomotive performance and train-timing enthusiasts, but also by railway engineers and others to whom this collection of gradient profiles will be useful, especially as most of the information now given has not hitherto been available in a form either as convenient or as complete.

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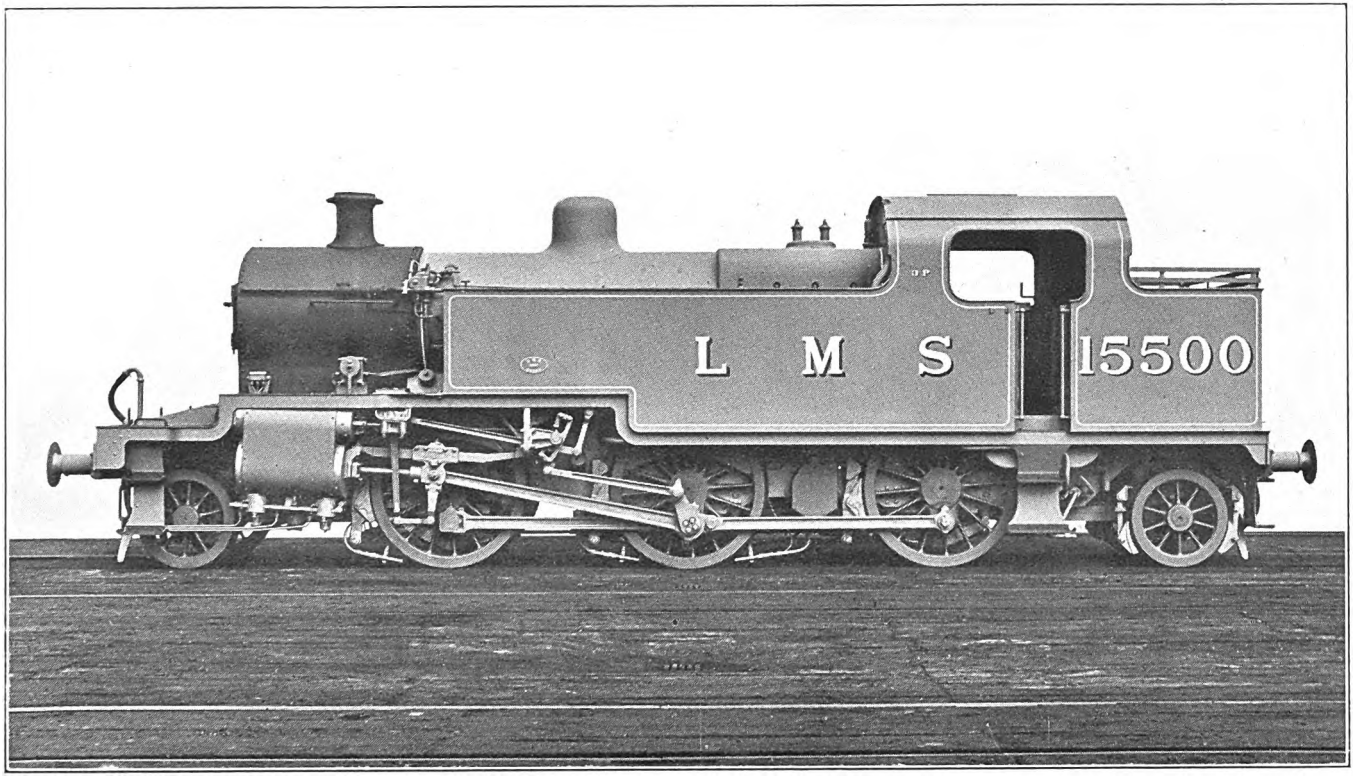

THE RAILWAY MAGAZINE.]

2-6-2 SUBURBAN TANK ENGINE, L.M.S.R.

Sir Henry Fowler, K.B.E., Chief Mechanical Engineer.

Cylinders : 17½ in. × 26 in. Coupled Wheels, 5 ft. 3 in. diam.
Heating Surface : Tubes, 692·75 sq. ft. ; Firebox, 103·5 sq. ft. ; Superheater, 172·75 sq. ft. ;
Total : 969 sq. ft. Steam pressure 200 lbs. per sq. in.
Weight in working order : 70 tons 10 cwts.

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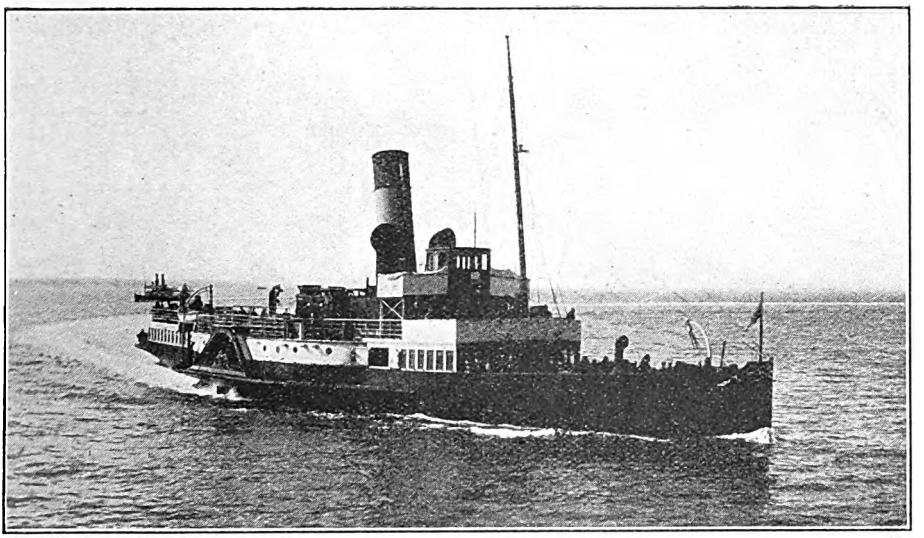

NEW S.R. STEAMER "MERSTONE."

Recent Isle of Wight Steamers.

By G. W. TRIPP, F.C.G.I., A.M.Inst.C.E., M.I.Mech.E.

(*Photographs by the Author.*)

CONSIDERABLE interest is taken in the communications between the mainland and the Isle of Wight, with its hitherto primitive railway systems, which increasingly lose their former identity under the modernising influence of the Southern Railway. But the Island must always have its own appeal, being cut off by a belt of water wide enough to afford it isolation and to ensure the retention of a life of its own, and yet not wide enough to deter indifferent sailors from making the crossing.

Within the last few years the Southern Railway materially strengthened its fleet of Solent steamers by three well-proportioned boats, intended to ply between the mainland and the Isle of Wight. The first to appear was *Freshwater,* reserved for the Lymington-Yarmouth crossing, where size is severely restricted by both the width and depth of the Lymington River at low water, the former difficulty precluding the use of double-enders. Skippers have assured me that at low spring tides their boats sometimes touch the bottom, even in mid-stream, and stones or foreign matter could easily become wedged in the bow rudder, which is an integral part of the double-ender. The width of river is the governing factor in the length of an ordinary steamer that has to swing.

In spite of all this, it has been possible to make *Freshwater* thirty feet longer and five feet broader than *Lymington,* which she supplanted, and her promenade deck is spacious and convenient, so that she gives the impression of being quite double the size of her predecessor. She was built in 1927 by J. S. White & Co., Ltd., Cowes, and has already been illustrated in these pages.*

The most important route to the Island is unquestionably that between Portsmouth and Ryde, on which even in the winter months there are fourteen sailings in each direction every weekday, with certain

* Page 407, Volume LXI.

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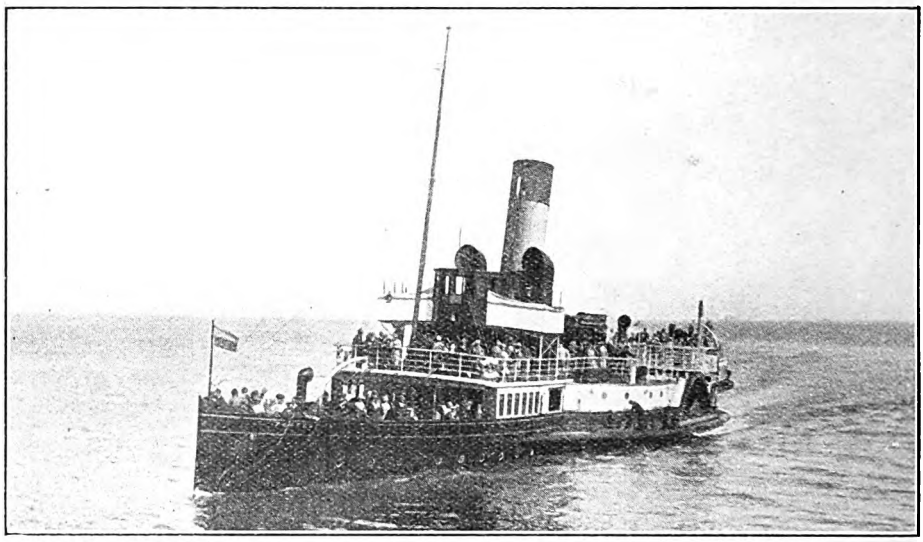

NEW S.R. STEAMER "PORTSDOWN."

specials, and eight each way on Sundays. To maintain this service a fair-sized fleet is necessary, and six large paddle-steamers are available. The two new vessels *Merstone* and *Portsdown* took up their stations at Portsmouth in 1928, and have already given a good account of themselves. They are generally similar to the other post-war vessel *Shanklin,* which appeared to be the prototype of the modern fleet. The arrival of these boats enabled the older and larger *Duchess of Fife* frequently to be released for special excursion work, which is only a reversion to pre-war practice, for in those days it was possible to have a fast run from town to Portsmouth and a cruise round the Isle of Wight on this very steamer, returning to London in the evening, all for six shillings.

Both new boats were built by the Caledon Shipbuilding and Engineering Company, Dundee, and are excellent examples of up-to-date short-distance paddle-steamers, attaining a sea speed of 13½ knots. They are equipped with good saloon accommodation and extensive promenade decks, which, however, are restricted to first-class passengers. It is open to question whether it would not be more economical to convert them to one-class steamers, thereby eliminating the expense of checking tickets, and the irritation felt by through third-class passengers when called upon either to pay excess fare or to be amidst trucks of luggage on the lower deck.

There is still a certain amount of competition for the carriage of passengers and goods to the Island, and this comes from the Southampton, Isle of Wight and South of England Royal Mail Steam Packet Company, although this route was more favoured in the past when the London and South Western Railway trains ran down on to the Royal Pier at Southampton, thus making a convenient connection with the steamers. Nowadays the knowledge that a bus journey is necessary from Southampton West to the pier serves as a deterrent to through passengers. However, during the winter months there are five sailings each way on weekdays, and on Sundays three to, and four from, Cowes, a large number of passengers from provincial centres finding the Southampton route a favourable one, and to such the advent of the *Princess Elizabeth* is of interest.

She is very similar to the popular *Princess Mary,* which unfortunately was lost during the war, and comes from the yard of the same builders, that of Messrs. Day, Summers & Company, Southampton. She does her turn on what the sailors describe as the "passage," *i.e.,* the mail run from Southampton to Cowes, but she is also employed at times on the

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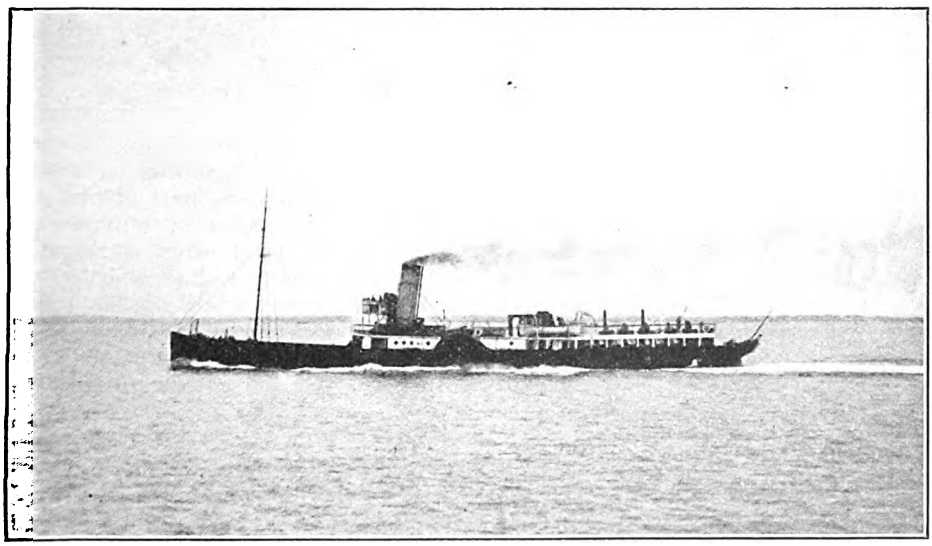
Name of Steamer.	Owner.	Dimensions in Feet.			Tons Gross.	Date Built.	Engines.	
		Length.	Breadth.	Depth.			Diam. of Cylinders (in.).	Stroke (in.).
Freshwater ..	S.R.	152	23	8·3	264	1927	19½	37–42
Merstone ..	S.R.	190	25	8·7	342	1928	27	51–54
Portsdown ..	S.R.	190	25	9·7	360	1928	27	51–54
Princess Elizabeth ..	S.I.W.S.P. Co.	195	24	8·0	388	1927	23	48–51

"grand cruise round the island," as well as on special sailings from different Island piers and Southsea to Southampton for excursionists to visit celebrated liners. It should be mentioned that similar jaunts are also undertaken by the railway packets from time to time.

For convenience of comparison the leading dimensions of the new boats are shown above in tabular form:—

A very definite advance is noticeable in the advent of the two paddle-steamers *Southsea* and *Whippingham,* which are being built for the Southern Railway by the Fairfield Shipbuilding and Engineering Company, and expected to be available for this summer's traffic. One will replace *Duchess of Fife,* hitherto the largest of the fleet, which has been sold to a Dutch firm, while the other will be additional to cope with increasing excursion traffic, and interesting developments, including trips round the Isle of Wight, may be expected. These steamers are more commodious and larger than any other vessels in the fleet, as the following dimensions will show: length, 254 ft.; breadth, 30 ft.; their designed speed being 16 knots (2½ more than *Merstone*), and each will carry about 1,350 passengers, a notable increase above the 723 of *Merstone.* Not only so, but they will be the finest vessels of their class in the Solent waters, where the largest privately-owned excursion steamer is shorter by about twenty feet.

The most noticeable distinctive features externally are the cruiser stern and the long promenade deck extending the whole length from bows to stern, a great advan-



SOUTHAMPTON-ISLE OF WIGHT STEAMER "PRINCESS ELIZABETH."

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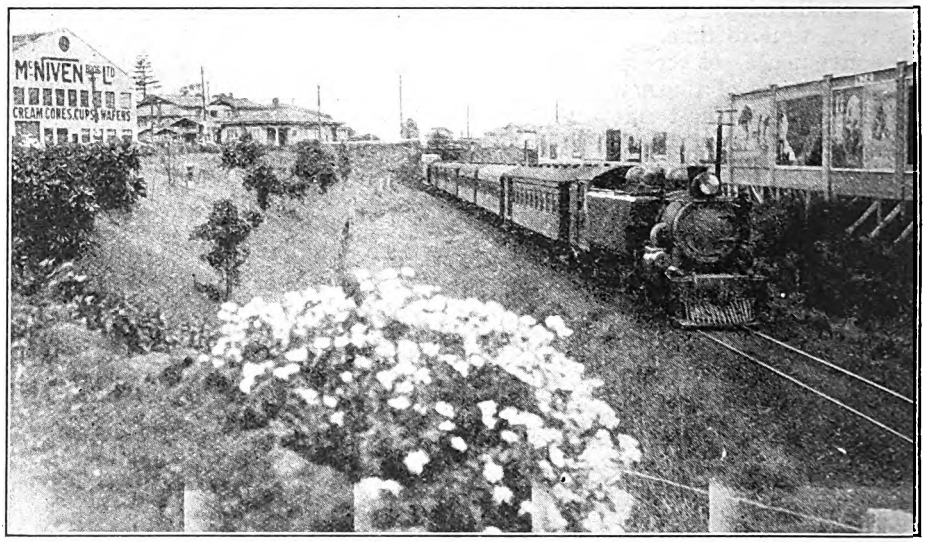
tage to passengers, particularly as luggage will now be lowered through two hatches to the main deck, where it will be well sheltered and no longer a nuisance!

Special attention has been paid to the saloon accommodation, and among other features may be mentioned a large smoke-room and bar in the centre of the promenade deck, a fine first-class saloon in polished oak on the main deck, and a commodious second-class saloon on the lower deck, as well as a refreshment and tea room.

It might be stated that both boats are driven by the latest type of compound diagonal engines, and altogether these steamers will prove a definite acquisition to a fleet that already enjoys a high reputation. Until a tunnel is constructed this steamer passage will probably be the most pleasant feature of a journey to the Garden Isle.

CHRISTMAS DAY IN NEW ZEALAND, 1929.



Mr. C. J. Housego, of Auckland, New Zealand, sends the above photograph, showing an Auckland-Henderson train, near Mount Eden, drawn by 4-6-4T No. 767. He explains that the triangular plot of ground shown on the left was changed from its rough form and untidy condition into a corner reserve, with lawns and flower beds on the level portion and trees and shrubs on the embankment. This was part of the Auckland City scheme for beautifying waste sections of ground at street corners. Unfortunately, however, the result has been rather seriously marred by the erection of the advertisement hoarding on the other side of the track, a part of which also appears in the photograph.

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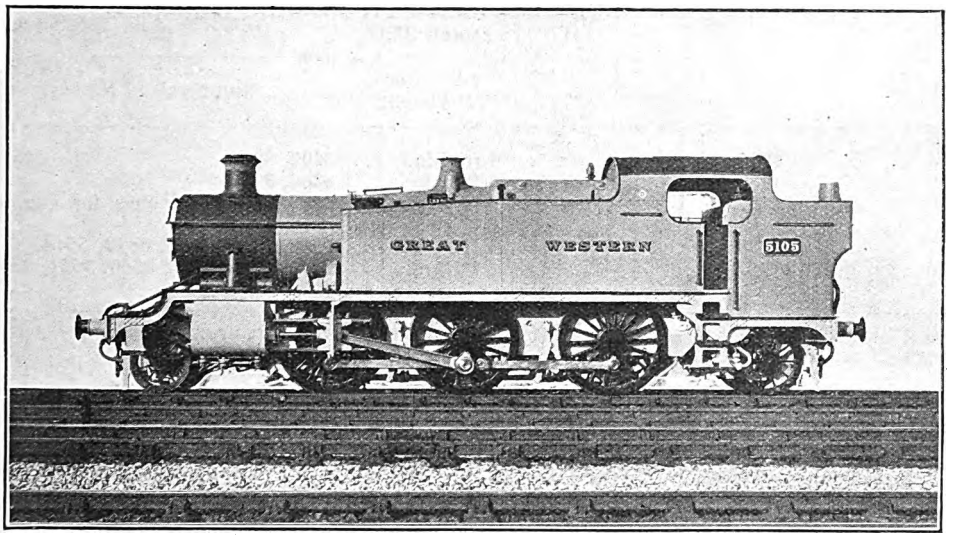

NEW 2-6-2T No. 5105.

Modern Locomotive Practice on the Great Western Railway.

(SUPPLEMENTARY NOTES, III.)

By F. W. BREWER, A.I.Loco.E.

IN the case of dealing with so varied and complicated, yet, withal, fascinating a history, as that of the locomotives of the G.W.R., it almost necessarily follows that there is what, for want of a better term, I may call a little "clearing up" to be done, including the recording of one or two new items, and the amplification of some old ones.

Before going into such matters, however, I publish, herewith, by the general desire of readers, and by the courtesy of Mr. C. B. Collett, O.B.E., the Chief Mechanical Engineer of the G.W.R., lists of the different classes and types of passenger and goods, tender and tank, engines (other than those of lines absorbed by the G.W.R. as a result of the grouping scheme of 1922-3) which were condemned down to December 21, 1929. From these lists, it will be seen that a beginning has been made with the scrapping of the "Bulldogs," and that twelve more of the "Cities" and nineteen more of the "Flowers" (all 4-4-0's) are among the 1929 withdrawals. At the date given (December 21), therefore, only three engines of the "City" class, originally consisting of twenty members, were left, while the number of 4-4-0's of the "Flower" series then uncondemned was eighteen, out of a former total of 74, one engine, old No. 3382, *Mafeking* (not renumbered), having been broken up in September, 1911.

In view of the interest attaching to the 6 ft. 8½ in. 4-4-0's, a separate list of those which are presumably still in service is supplied on p. 430, and in this connection it will be noted that it includes the famous No. 3717, *City of Truro,* and a few engines of each of the three classes which eventually became known as "Flowers," viz., the "Badmintons," the "Atbaras" and the "Flowers" themselves. The list also includes the only survivor of the converted "Armstrongs," No. 4169 (old No. 16), *Brunel.*

Returning to the withdrawals, several more of the 2-4-0's and 4-4-0's. those

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G.W.R. PASSENGER TENDER ENGINES CONDEMNED IN 1929.
(To December 21.)

Type.	Date.	Frames.	Diameter of Wheels.	Numbers and Names.
2-4-0	1885	Outside	5 ft. 2 in. ..	3202, 3204.
2-4-0	1889	,, ...	6 ft. 2 in. ..	3209, 3212.
2-4-0	1892	Inside	6 ft. 8½ in. ..	3232. (Inside frames for coupled wheels).
2-4-0	1885	Outside	5 ft. 2 in. ..	3503, 3507, 3508, 3512, 3514.
4-4-0	1889-1902	,, ...	5 ft. 2 in. ..	3525, 3533, 3548, 3550, 3551, 3552, 3555.
4-4-0 "Bull-dog" Class.	18 9	Outside	5 ft. 8 in. ..	3320, *Avalon.*
4-4-0 "City" Class.	1901	Outside	6 ft. 8½ in. ..	3700, *Durban.*
	,,	,, ...	,, ..	3702, *Halifax.*
	,,	,, ...	,, ..	3703, *Hobart.*
	,,	,, ...	,, ..	3706, *Melbourne.*
	,,	,, ...	,, ..	3707, *Malta.*
	,,	,, ...	,, ..	3708, *Killarney.* (*a*)
	,,	,, ...	,, ..	3709, *Quebec.*
	1903	,, ...	,, ..	3713, *City of Chester.*
	,,	,, ...	,, ..	3714, *City of Gloucester.*
	,,	,, ...	,, ..	3715, *City of Hereford.*
	,,	,, ...	,, ..	3716, *City of London.*
	,,	,, ...	,, ..	3719, *City of Exeter.*
4-4-0 "Flower" Class.	1897	,, ...	,, ..	4100, *Badminton.*
	1898	,, ...	,, ..	4104, *Cambria.*
	,,	,, ...	,, ..	4106, *Grosvenor.*
	,,	,, ...	,, ..	4112, — (*b*)
	1900	,, ...	,, ..	4120, *Atbara.*
	,,	,, ...	,, ..	4127, *Ladysmith.*
	,,	,, ...	,, ..	4131, *Powerful.*
	,,	,, ...	,, ..	4138, *White.*
	1901	,, ...	,, ..	4140, — (*c*)
	,,	,, ...	,, ..	4143, *Capetown.*
	1908	,, ...	,, ..	4149, *Auricula.*
	,,	,, ...	,, ..	4156, *Gardenia.*
	,,	,, ...	,, ..	4158, *Petunia.*
	,,	,, ...	,, ..	4159, *Anemone.*
	,,	,, ...	,, ..	4161, *Hyacinth.*
	,,	,, ...	,, ..	4162, *Marguerite.*
	,,	,, ...	,, ..	4163, *Marigold.*
	,,	,, ...	,, ..	4167, *Primrose.*
	1923	,, ...	,, ..	4172, *Gooch.* (*d*)

(*a*) Formerly *Ophir* (till 1907).
(*b*) Formerly *Oxford* (till 1927).
(*c*) Formerly *Adelaide* (till 1911).
(*d*) Date converted to "Flower" Class.

with 5-ft. 2-in. wheels, have gone ; also two further 6-ft. 2-in. 2-4-0's of the "3206" class, and one additional engine of the same type, but with 6-ft. 8½-in. wheels, of the 3232-3251 series, this example being, in fact, No. 3232 itself. Of this latter class only two engines remained on December 21, their numbers being, I believe, 3234 and 3251. The "3232's" have inside frames for the coupled wheels, and the "3206's" double frames throughout.

As regards the 0-6-0 tender engines, the number taken out of traffic last year was twenty-one, made up of three Beyer-Peacocks, fifteen Armstrongs and three of the Dean inside-framed class.

Of the old six-wheeled passenger side-tank engines, thirty-two were condemned in 1929, comprising twelve 2-4-0's and twenty 0-4-2's.

Pannier or saddle tank 0-6-0 engines, to the total number of seventy-seven, were also withdrawn, and thirty-two 2-8-0 tender engines, of the "R.O.D." type, shared the same fate.

It will, I think, readily be acknowledged that the foregoing lists and par-

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G.W.R. GOODS AND MINERAL TENDER ENGINES CONDEMNED IN 1929.
(To December 21.)

Type.	Date.	Frames.	Diameter of Wheels.	Numbers.
0-6-0 (Armstrong).	1864	Outside	5 ft. 2 in. ..	328, 330, 336 (B. P. & Co.).
	1867	,, ...	,, ..	400, 422 (Armstrong).
	1870	,, ...	,, ..	510. ,,
	1871	,, ...	,, ..	601. ,,
	1872	,, ...	,, ..	705, 709. ,,
	1874	,, ...	,, ..	877. ,,
	1867	,, ...	,, ..	1012. ,,
	1866	,, ...	,, ..	1015 (Armstrong's first series).
	1870	,, ...	,, ..	1087, 1089, 1092.
	1876	,, ...	,, ..	1187, 1193, 1214.
0-6-0 (Dean) ..	1883	Inside	5 ft. 2 in. ..	2304, 2306, 2318.
2-8-0 "R.O.D." Class.	—	Inside	4 ft. 8 in. ..	3050, 3051, 3052, 3053, 3055, 3056, 3057, 3059, 3060, 3061, 3062, 3063, 3065, 3069, 3072, 3074, 3075, 3076, 3077, 3078, 3079, 3080, 3083, 3085, 3087, 3088, 3089, 3091, 3096, 3098, 3099.

G.W.R. 0-6-0 SADDLE OR PANNIER TANK ENGINES CONDEMNED IN 1929.
(To December 21.)

Date	Where Built.	Frames.	Diameter of Wheels.	Numbers.
1865	Wolverhampton	Outside ..	4 ft. 7½ in.	308.
1872	,,	Inside ..	,,	652.
1892	,,	,, ..	,,	655.
1872	Swindon ..	Outside ..	,,	728, 731, 740.
1873	,, ..	,, ..	,,	755, 771, 773.
1874	,, ..	,, ..	,,	953, 964, 966.
1867	Wolverhampton	,, ..	,,	1017, 1024, 1033.
1868	,,	,, ..	,,	1038.
1870	,,	,, ..	,,	1040, 1044, 1052.
1871	,,	,, ..	,,	1064, 1073.
1875	Swindon ..	,, ..	,,	1146, 1177, 1182.
1876	Wolverhampton	Inside ..	4 ft. 1½ in.	1218.
1877	Swindon ..	Outside ..	4 ft. 7½ in.	1249, 1258, 1280, 1283.
1878	,, ..	,, ..	,,	1291.
1878	Wolverhampton	Inside ..	,,	1504, 1510, 1512, 1515.
1879	,,	,, ..	,,	1520.
1880	,,	,, ..	,,	1550, 1553, 1555, 1559, 1560.
1879	Swindon ..	Outside ..	,,	1581, 1588, 1604.
1880	,, ..	,, ..	,,	1612, 1613, 1616, 1618, 1619, 1622,
,, ..	,, ..	,, ..	,, ..	1631, 1633, 1634, 1636.
1886	,, ..	,, ..	5 ft. 2 in.	1664, 1669, 1675, 1684.
1887	,, ..	,, ..	,,	1687, 1697.
1892	,, ..	Inside ..	4 ft. 7½ in.	1724, 1772.
1893	Wolverhampton	,, ..	,,	1781.
1883	Swindon ..	,, ..	,,	1834, 1843, 1852.
1881	Wolverhampton	,, ..	4 ft. 1½ in.	1901.
1882	,,	,, ..	,,	1913, 1918.
1884	,,	,, ..	,,	1927.
1886	,,	,, ..	,,	1939.
1888	,,	,, ..	,,	1953.
1889	,,	,, ..	,,	1962.
1890	,,	,, ..	,,	1972, 1986.
1891	,,	,, ..	,,	1987, 1997.
1892	,,	,, ..	,,	2003.

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ticulars, like those previously published in connection with these articles, are of no little historical interest and value.

I may add that, of the outside-framed 5-ft. 2-in. 2-4-0's, No. 3201, built in 1885, and at one time named *Stella,* is possibly still in service, as it was not among the withdrawals down to December 21 last. This engine, together with No. 1813, *Holmwood* (then a side tank and later a pannier tank engine, scrapped in 1928), received their respective names when sold to the Pembroke and Tenby Railway, on which they worked until the line was amalgamated with the G.W.R. in July, 1897. The *Holmwood* was constructed at Swindon in 1882.

Last year, Mr. Collett commenced the construction of twenty additional 5-ft. 8-in. 2-6-2 tank engines. Although of the mixed traffic order, the engines of this new batch, which have 18-in. by 30-in. cylinders, are intended more especially for heavy suburban work. They are numbered 5101-5110 and 5150-5159. At the moment of writing these notes, all but four (Nos. 5156-5169) had been officially put into service, as under:—

Nos. 5101–5106	November, 1929.
,, 5107–5110	December, 1929.
,, 5150–5152	February, 1930.
,, 5153	March, 1930.
,, 5154–5155	February, 1930.

Standard "2" boilers are fitted to these engines, the maximum diameter being 5 ft. 0½ in. with a barrel length of 11 ft. Including that of the superheater, the total heating surface is 1,348.95 sq. ft., while the grate area is 20.35 sq. ft., and the steam pressure 200 lb. per sq. in. The tractive effort is 24,300 lb. In full running order, the engines weigh 78 tons 9 cwts. (of which 52 tons 13 cwts. are available for adhesion), and have a tank capacity of 2,000 gallons. The leading end is carried on a pony truck and the bunker on a radial axle, the former having 3-ft. 2-in., and the latter 3-ft. 8-in. wheels. The springs of both these pairs of wheels are connected by compensating beams to the springs of the adjacent pair of coupled wheels. The rigid wheelbase is 14 ft. 9 in.; the total wheelbase 31 ft. 9 in.; and the length over buffers 41 ft.

Some explanation of the numbering of these engines is necessary. The first G.W.R. locomotive of the 5-ft. 8-in. 2-6-2T type was introduced by Mr. G. J. Churchward in 1903; it was then numbered 99, and at the end of 1912 became 3100. The next lot comprised Nos. 3111-3130, built in 1905, followed by Nos. 3131-3149 in 1906. All of these had S/2 boilers and 18-in. by 30-in. cylinders. Forty-one more were built, No. 3150 being turned out in 1906, Nos. 3151-3182 in 1907, and Nos. 3183-3190 in 1908, most or all of which had 18½-in. cylinders, and all had S/4 boilers. In 1928 Mr. Collett decided to increase the weight on the leading truck of the S/2-boilered batches, and at the same time to reclassify them and to number them in the 5100's. The list which I published in the February, 1929, issue consisted of 16 members of the "3100" class, which had then been renumbered, but the present position is that all of the first 40 engines of that class (with the possible exception of No. 3127, which had yet to be altered), have been renumbered, so that old Nos. 3100 and 3111-3149, inclusive, are now Nos. 5100 and 5111-5149. This leaves Nos. 5101-5110 (Nos. 3101-3110 have, by the way, been blank since 1912) to be accounted for, and the first-mentioned numbers have, accordingly, been allotted to the new 5-ft. 8-in. 2-6-2T's. The next new set commences at No. 5150, following the renumbered 3149 (now No. 5149), the result being that the 60 engines in question are now numbered consecutively, as under:—

Nos.	Year Built.	Class.
5100	1903	S/2 boiler.
5101–5110	1929	,,
5111–5149	1905–6	,,
5150–5159	1930	,,

From the accompanying illustration of No. 5105, of 1929, it will be observed that the new 2-6-2T's are generally similar to the engines built subsequently to No. 3100 (old No. 99), but have the improved style of outside footplating, carried in a curve at the front end. The pony truck carries 11½ tons.

The series of eighty engines of the "Hall" class of 18½ in. by 30 in. two-cylinder 6-ft. 4-6-0's has now been completed. To the list of names published in the March number, p. 238, must be added:—

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No.	4972	*St. Brides Hall.*
,,	4973	*Sweeney Hall.*
,,	4974	*Talgarth Hall.*
,,	4975	*Umberslade Hall.*
,,	4976	*Warfield Hall.*
,,	4977	*Watcombe Hall.*
,,	4978	*Westwood Hall.*
,,	4979	*Wootton Hall.*
,,	4980	*Wrottesley Hall.*

The dates on which the various batches of "Halls" were completed at Swindon were as follow:—

Nos.	Date.
4901–4905	December, 1928.
4906–4910	January, 1929.
4911–4916	February, 1929.
4917–4920	March, 1929.
4921–4923	April, 1929.
4924–4931	May, 1929.
4932–4938	June, 1929.
4939–4944	July, 1929.
4945–4950	August, 1929.
4951 —	July, 1929.
4952–4955	August, 1929.
4956–4960	September, 1929.
4961–4966	November, 1929.
4967–4970	December, 1929.
4971–4977	January, 1930.
4978–4980	February, 1930.

Tenders of a new pattern have been provided for these engines. They have a water capacity of 3,500 gallons, and weigh 45 tons 3 cwts. The old tenders carried the same quantity of water but weighed 40 tons. Weight of engines, 75 tons.

Readers will be interested to learn that another of the earlier four-cylinder 4-6-0's, No. 4000, *North Star,* was converted to the "Castle" class in November, 1929. The old and peculiar arrangement of the Walschaert valve-gear of this engine has been replaced by the G.W.R. standard Walschaert motion. The *North Star* was the pioneer of the four-cylinder simples; it was originally constructed as a 4-4-2 in April, 1906, and was rebuilt as a 4-6-0 in 1909. The first of the four-cylinder six-coupled engines, to be built as such, was No. 4001, *Dog Star,* turned out in 1907. There are now five engines of the "Star" series which have been rebuilt as "Castles."

A few sundry matters arising out of previous instalments must next engage our attention. From a reliable source I have ascertained that the two small 0-4-4T's, Nos. 34 and 35 of 1890, were both disposed of by the G.W.R., and that No. 35 was not broken up (*vide* the issue for November, 1929, p. 352). This latter engine is at Longmoor Camp (the R.E. training centre), and bears the name *Borden.* As previously notified, No. 34 is named *Longmoor.*

With reference to the note (*d*) in the same issue, p. 355, in connection with the saddle-tank engines, it should be stated that three members of the "645" class were sold to the Carmarthen and Cardigan Railway. One of these three was G.W.R. No. 655, but the two others were not numbered in Great Western stock. When, in 1881, the Carmarthen line was merged into the G.W.R., the three engines in question were numbered 902, 903 and 904, and of these three No. 904 was formerly No. 655. This number, and No. 767, that of an engine similar to 655, and also sold, remained blank until 1892, when they were given to two newly-built 0-6-0 saddle-tank engines (Nos. 655 and 767).

So far as I have been able to discover, the tank engines mentioned below were those which were fitted with carriage-body coverings for auto-train services:—

No. 533, 5-ft. 2-in. 0-4-2 side tank.
No. 833, 5-ft. 2 in. 0-4-2 side tank.
No. 2120, 4-ft. 1½-in. 0-6-0 saddle tank.

These were all originally constructed at Wolverhampton—in 1869, 1873 and 1903, respectively.

A word or two must be added in regard to the two larger 4-4-2 French compounds, Nos. 103 and 104 (now broken up). It is practically certain that when these engines were delivered from Belfort they had cabs (with two side windows and raised roofs), like those fitted to the Paris-Orleans Railway compounds, of which, a few minor details excepted, the G.W.R. engines were replicas. This would appear to be confirmed by the fact that a G.W.R. official outline drawing, published in the *Engineer,* dated February 2, 1906, represents Nos. 103 and 104 as having had such cabs, as built. These cabs were either too wide, or else they had some other defect, and they were accordingly replaced by more suitable structures.

In response to inquiries from readers, fuller information is now given respecting the eight "new" double-framed 0-6-0's, Nos. 136, 139 and 141-146, of 1886-87, which were alluded to on p. 45 of my

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G.W.R. PASSENGER TANK ENGINES CONDEMNED IN 1929.
(To December 21.)

Type.	Date.	Frames.	Diameter of Wheels.	Numbers.
0-4-2T (Wolverhampton)	1876	Inside	5 ft. 2 in. ..	220, 221.
	1869	,, ...	,, ..	531, 532, 535, 536, 541, 543, 549, 550, 551, 561, 562, 563.
	,,	,, ...	,, ..	
	1874	,, ...	,, ..	838, 840.
	1878	,, ...	,, ..	1441.
	1883	,, ...	,, ..	1467, 1476.
	1885	,, ...	,, ..	3576.
2-4-0T (Swindon)	1869	Inside	5 ft. 2 in. ..	463.
	1871	,, ...	,, ..	624, 630, 632.
	1878	,, ...	,, ..	1405, 1406, 1411, 1414, 1418.
	1881–2	,, ...	,, ..	1448, 1457, 1462.

January, 1930, article on the goods tender engines. The engines in question, which were replacements of members of the "131" class, were turned out at Wolverhampton in the undernoted years, the dates on which they were scrapped being also given:—

No.	Year Built.	Year Scrapped.
136* ..	1886	1921
139 ..	1886	1919
141 ..	1886	1919
142* ..	1886	1919
143 ..	1887	1919
144* ..	1887	1919
145* ..	1887	1914
146* ..	1887	1925

* Subsequently rebuilt with Belpaire boilers.

As then constructed, they had 17-in. by 24-in. cylinders, 5-ft. 2-in. coupled wheels, 1,393.3 sq. ft. of heating surface and 150 lbs. steam pressure. The tractive force was 14,265 lbs. The engines weighed (full) 35 tons 6 cwts., and the tenders (2,500 gallons) 29¼ tons. The frames were, as before, of the "broad-gauge" slotted pattern, but were longer than those of the original batch, and the engines had a wheel base of 15 ft. 9 in. (8 ft. 0 in. plus 7 ft. 9 in.). Five out of the eight engines were afterwards fitted with standard Belpaire boilers, the heating surface of which was 1,275.20 sq. ft., and the working pressure 165 lb. per sq. in. Four, Nos. 136, 142, 144 and 145, were so rebuilt in 1912, and the fifth, No. 146, in 1920. The tractive force was increased to 15,685 lbs., and the weight of the engines to 36 tons 2 cwts. New tenders, weighing 34¼ tons, were provided; these, like the old ones, had a wheelbase of 13 ft., and a tank capacity of 2,500 gallons.

In connection with the "310's" (the

G.W.R. LIST OF 6-FT. 8½-IN. 4-4-0's RUNNING AT DECEMBER 21, 1929.

No.	Name.	Year Built.	No.	Name.	Year Built.
	"City" Class:		4113	*Samson*	1898
			4115	— *	,,
3711	*City of Birmingham* ..	1903	4124	*Kitchener*	1900
3712	*City of Bristol*	,,	4130	*Omdurman*	,,
3717	*City of Truro*	,,	4132	*Pembroke*	,,
			4141	*Aden*	1901
	"Flower" Class:		4145	*Dunedin*	,,
4101	*Barrington*	1898	4148	*Singapore*	,,
4103	*Bessborough*	,,	4150	*Begonia*	1908
4107	*Alexander Hubbard* ..	,,	4154	*Campanula*	,,
4108	*Hotspur*	,,	4164	*Mignonette*	,,
4109	*Monarch*	,,	4168	*Stephanotis*	,,
			4169	*Brunel*†	1915

* Formerly *Shrewsbury*; name removed in 1927.
† Date altered to "Flower" Class.

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other engines of the same class of 0-6-0's), I have officially ascertained that, of those cited by me on p. 44, Belpaire fireboxes were fitted to No. 311 in 1905 and to No. 312 in 1912; further, that among the "renewals" must be included Nos. 313 and 315, both of which were reconstructed at Wolverhampton in 1886. All of these "310's" had lengthened frames, and their new boilers were generally similar to those of the rebuilds, Nos. 136, 139, &c. As in the latter, the wheelbase was 15 ft. 9 in. Two brand new engines, Nos. 316 and 317, were built in 1890, and a third, No. 318, in 1891, all three at Wolverhampton. As turned out, these also had longer frames, yet, in their case, the wheelbase was only 15 ft. 8 in. (8 ft. 0 in. plus 7 ft. 8 in.). In 1920, No. 316 was provided with a Belpaire boiler, but Nos. 317 and 318 were not so rebuilt. The first-mentioned engine, No. 316, was broken up as recently as 1927. All, of course, had 17-in. by 24-in. cylinders and 5-ft. 2-in. wheels.

The dates on which Nos. 310-319 were condemned are appended:—

Nos.		Year Renewed.	Year Scrapped.
310	..	1883	1911
311*	..	1884	1913
312*	..	1884	1923
313	..	1886	1913
314	..	1878	1894
315	..	1886	1905
316*	..	1890	1927
317	..	1890	1921
318	..	1891	1919
319†	..	—	1880

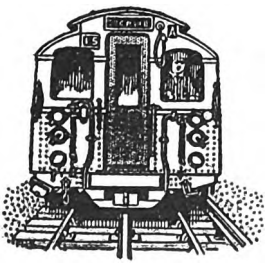
* Subsequently rebuilt with Belpaire boilers.
† Not renewed; old frames retained (W.B. 15 ft. 6 in.). All the others had lengthened frames.

The above additional information, and also that respecting Nos. 136, 139 and 141-146, has been kindly supplied by Mr. Collett.

I have now to correct two or three errors. In the November, 1929, issue, p. 353, No. 1413 got mixed up with the 0-4-2T's. It is a 2-4-0 tank engine. In the January number, p. 42, col. 2, "383" should have been "388," for the standard series of 0-6-0's; next, the mention on p. 45, col. 2, that only one of the Beyer-Peacocks, No. 328, had so far been condemned, referred exclusively to the year 1929, and down to the time of compiling the MS.; and, lastly, on p. 48, col. 1, the dates of two of the 0-6-4 crane tank engines, Nos. 17 and 18, had got transposed in the *text* (not in the list), the year 1901 being printed instead of 1903, and 1903 in place of 1901, in the sequence here given.

The information given in the March, 1929, number, respecting the 4-4-0 tank engines, Nos. 13 and 1490, also requires to be amended. Further official investigation shows that the former, originally built as a 2-4-2T in 1886, was converted to a 4-4-0T in 1897, and therefore preceded No. 1490. The latter was turned out at Swindon in 1898 (not 1899). It eventually became the property of the Cramlington Coal Co., Ltd., Northumberland, and was broken up last year. As regards No. 13, this was scrapped by the G.W.R. in 1926.

I desire to record my appreciation of further interesting and helpful correspondence received from Mr. J. N. Maskelyne, Mr. Francis J. Tabor, Mr. F. H. C. Casbourn, Mr. R. Abbott, the Rev. Edward Ravenscroft and Capt. G. G. Templer.



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My Last Trip on the Knott End Railway.

By J. E. N. ASHWORTH.

I CROSSED from Fleetwood to Knott End by the Fleetwood Corporation Ferry, and on entering the adjacent station everything appeared much the same as usual, except that a notice-board announced that "The Passenger Service will be withdrawn from the Knott End Branch," &c. I booked excursion to Garstang and Catterall, and, incidentally, obtained the last return ticket issued from Knott End for the whole length of the line. I took a photograph of the ex-L.N.W.R. motor train (now No. 10698) which has worked most of the passenger traffic on this line for several years. I took my seat in the train, and, shortly before we left, several cameras appeared.

As this was the last trip for this train-crew, there was some hand-shaking, and as we passed each level-crossing the keeper was waving "good-bye." We collected numerous passengers at the stops, many of them "just bringing the children for a last ride," until, by the time we arrived at Garstang (Town) the little train was nearly full. If every train had carried so many people there would have been no question of closing the line!

Most of the passengers left at Garstang, and the train-crew was changed among much whistling. Then we left for Garstang and Catterall Station, where the train runs into a bay on the outer side of the down main-line platform. Here, connections are made with trains to Preston, Lancaster, and beyond.

Apparently passenger-traffic has been scanty for a long time. The chief stations are Garstang, Nateby, Pilling, Preesall and Knott End. Garstang is a market town, but it is on a main road well served by buses; Knott End is a small seaside resort, but most people prefer to travel there *via* Fleetwood and the ferry, and the other three places are but villages.

The train service consisted of five trains on weekdays only in each direction (six in summer) and two extra ones in either direction between the town station and the junction with the main line. The average time taken was 38 minutes to cover the 11½ miles. The bus service which replaces the train provides six trips in one direction and seven in the other, and two or three trips are made between Knott End and Garstang, but does not connect with trains on the main line. The time taken by the buses is on an average 50 minutes. Garstang, Nateby, Pilling, Preesall and Knott End stations will remain open for parcels and general goods traffic, but the halts will be closed. There is also a siding near Preesall, serving salt-works. The goods traffic is worked by 0-6-2 tank engines of the 11600 class (late L.Y.R.), two of which (Nos. 11613 and 11616) were at the shed at Garstang as we passed.

The return journey from Garstang and Catterall to Knott End was the last through trip in this direction. We left with a fair complement of passengers, with the whistle working overtime. At Garstang (Town) the train was filled up, and we left amidst more whistling, to the accompaniment of numerous fog-signals. The journey to Knott End was uneventful; at all the level-crossings people were waving, and there were fog-signals on the track at various places. At last we arrived at the terminus, and I stayed on the platform to see the last train depart from Knott End. It rounded the curve, and then all that could be seen was a cloud of steam. A few minutes later, as I made my way down to the ferry-boat, the engine's whistle could again be heard "crowing," and the bangs of two fog-signals indicated the departure of the last passenger train from Preesall station.

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Reminiscences of a Retired Great Western Railway Superintendent.—(IV.)

By the late G. GRANT,

(*Formerly Divisional Superintendent at Chester and Plymouth. Mr. Grant retired in* 1911.)

THE Great Western passenger and parcels business at Liverpool and Manchester was under my supervision. As our terminus was at Birkenhead on the Cheshire side of the Mersey, that strong tidal stream, over half a mile wide, cut off my company from the traffic on the Lancashire side, except by the tedious process of boating. What efforts were in the case practicable were made. We had several offices in the city. Our representatives met incoming American boats and pointed out to visitors the attractive places, Chester, Warwick, Stratford-on-Avon, Oxford, Windsor, that were on our route to London. For a time Mr. Macaulay, the Manager of the Mersey line, ran a through carriage from the Central Station to Paddington. We added something to our parcels business.

Manchester afforded me little compensation. The Great Western Company had no station of its own; our traffic and trains were dealt with by the London and North Western Company's staff. When I watched the crowds at Exchange or London Road Stations, it was an optimistic estimate that our share was 1 per cent.

My position caused me to be interested in Chester Races, especially on the Cup day. I cannot imagine a greater admixture of classes, from prince to beggar, or more variety in turn-outs, from a duke's coach-and-six to the coster's donkey. The ninety additional trains that day left no margin for eventualities. One Cup day an engine failed between two small stations and caused the following trains to arrive an hour late. Passengers came in a discontented mood, with a few caustic comments. Thanks to the care and smartness of the inspectors and signalmen at Chester Station no accident on the busy Cup day occurred in the twelve years I was at Chester.

Another event I was glad to see over was Shrewsbury Floral Fête. On the second day, 40,000 people came there from Leeds, Liverpool, Bristol, Birmingham and intermediate places. Return trains at night had to be compressed into a few hours, sixteen of them had to be started from the goods yards. There were no platforms; the illumination was a few oil lamps. Passengers had to cross lines of rails to reach their trains. Men were engaged to direct passengers, but in the dim light they could escape observation. Some came hours before their train was due to leave, to reach their train some would creep between carriages. I was relieved when midnight arrived and no mishap had occurred.

The cessation of goods trains on Bank Holidays provided engines and guards for additional passenger trains. After making enquiries about business at Shewsbury, I went to Llangollen, the favourite inland resort of Welsh people in North Wales and Liverpool. The place has interest, and is situated in a cleft of the Berwyn Range, with the River Dee flowing over a rocky surface, under a bridge said to be one of the seven wonders of Wales.

The biggest crowd the place ever had was in 1889 when Queen Victoria came here on a visit to Sir Theodore and Lady Martin (Helen Faucet). I was one of eighteen people in a compartment that day. On Bank Holidays, if wet, people wanted to leave early, if fine, the last trains were packed. At Llangollen for some years there was but one line of rails for up and down trains, which added to the difficulties. The jovial humour and good-natured fun of the crowds were an abiding feature.

The District Superintendents usually met at Reading. I attended these meetings from 1891 to 1911. Mr. Allen was at the head of the table for ten years, a man beloved by all. A rebuke from him was almost a compliment. Mr. Morris,

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whom I succeeded at Chester, had been Mr. Allen's assistant and followed him as Chairman. He had had a wide experience in the working of the joint lines at Chester. Among my colleagues were Mr. Kislingbury, of Bristol, and Mr. Roberts, of Reading. Mr. Hart I had known at Bridport in 1864. His long service at Paddington made him the best known railway officer in southern England. Sometimes we, in the distant counties, had to smile when threatened by an aggrieved passenger with a report to Mr. Hart. Mr. Leaning, of Cardiff, filled an onerous position among the collieries in South Wales. Mr. Adye went from Worcester to Birmingham, Cardiff and Plymouth, and I succeeded him at the latter place.

These meetings had this advantage. The line being divided into sections, trains ran through four or five of them. Its course could be traced, say, from Penzance to Paddington. The officer in whose division a delay had occurred had to explain why and suggest a remedy. The most common causes for delays were waiting connections and heavy traffic at important junctions and hindrances due to fog. Wolverhampton had the worst record for fogs in my time.

As regards delays, one may have to go to Swansea for explanation of a delay at Swindon. I travelled 120 miles on another line to find out why a train was late at a Great Western junction. As a representative of the locomotive department was present, time lost by engines could be dealt with.

Any increase in expenses had to be explained and justified. Infringements of the rules for safe working were considered and uniformity in penalties assured. Subjects of a private or semi-private character could be mentioned here better than in correspondence.

During the twenty years I was a member, one discussion made a lasting impression. Two colleagues, of long service and wide experience, differed as to which was responsible for a long delay when an express engine failed in a long tunnel. Their control met in the tunnel. Their arguments and contentions showed how, in an emergency, serious differences may arise in the interpretation of rules, or from an inference by a man on one side as to what the man on the other side would and should do. To an ordinary reader the instructions seemed clear, but here was an instance how circumstances, viewed from different standpoints, led to misunderstanding and serious delay.

WREXHAM STATION IN 1870.

Once we had to report on what economies we had effected. Mr. Leaming, recently appointed to a division, said: "I have taken off ten shunting engines." The equivalent of £10,000 a year. Now and then silent members could smile at the loquacity of some colleagues ; nearly

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an hour was once occupied as to whether twenty caps should be decorated with worsted or gold braid!

A literal script would sometimes have been embarrassing to our schoolmasters. One member said the trains wanted "consecrating," when he meant "concentrating"; that a certain man was not "ligible," omitting the "e." Such trifles were no indication of incompetency in control or management by the speaker.

Meetings were held monthly to see if merchandise and mineral trains kept good time and were adapted to traffic. Each important train was traced through the several divisions, its timekeeping and loading recorded. If there was doubt about the cause of a delay, an inspector was appointed to travel with the train and report. Much depended on the punctuality of our trains at Manchester, they had to run 30 miles over a competitor's line.

The great enemy to punctuality was fog. It was usual at one point in my division to lose 50,000 minutes a month. One specially bad month, in another division, the delays amounted to a million minutes. During my time circumstances so changed that where in the earlier period a goods train made two trips a day between two junctions thirty miles apart, in the later time it could not make even one. So much had more trains, combined with shorter hours, added to working difficulties and costs.

These meetings gave young officers an opportunity to learn about railway business and ways of carrying it on outside the district with which they were connected. In one respect I think we failed. Where existing accommodation made it impossible for trains to run to time, as where one train was regularly put aside until twelve others had passed, we seemed too timid to suggest a remedy. When one was suggested, it did not appear on the final minutes.

I often visited some part of the country between Liverpool, Aberystwith and Wolverhampton, and derived pleasure from scenery, rivers, mountains, castles and the people I met. Where I had time, I walked from one station to another to see signalmen at intermediate cabins and gatekeepers at level crossings. My peripatetic rambles showed the confidence one could place in our staff. They had no intimation of my movements, but I found them as if chained to their posts. As I generally returned by a different route from my forward journey, a few times I gave surprise. One day the stationmaster, an excellent servant, was entertaining his lad porters with a tin whistle. At another station I found a porter asleep on a platform seat. These visits gave me news about sick members, claims, trifling irregularities or delays.

My business at Aberystwith was to see that proper arrangements were made for the return of the many visitors who went there by the Great Western route from Birmingham. Once my watch had stopped ten minutes and caused me to miss the last train to Chester. It was important for me to be there early next morning. I found, if I travelled by goods trains and waited two hours at Moat Lane and two hours at Welshpool, I might arrive at Chester at 8.30 a.m. Upon arrival at Moat Lane Station it was at once closed. Where could I spend the time until midnight? The signalman would have a fire in his cabin. As I entered it I apologised for intruding. Quite casually I asked if there was any train going towards Welshpool? To my surprise and joy he said one was then inside the distant signal. I begged him to stop it, which he did; that landed me at Oswestry by midnight; a walk of two miles to Gobowen and I caught an express goods, which reached Chester at 2 a.m. I was thus able to get four hours sleep and attend to business in the morning—which was signing cheques to pay the wages of two thousand men.

The first corridor train on the Great Western line ran from London to Birkenhead, 87 miles through the Chester division. The comfort and convenience thereby given led me to contrast it with what the third-class passenger had to put up with in early days.

For many years the only expedient for warming carriages was the old tin footwarmer, a subject for jokes—clumsy, soon cold, at times leaking. Now the whole train is warmed by heat that can be regulated in each compartment. Lighting in the early period was to make darkness visible. Even in the first-class carriage the oil lamp in the roof did not

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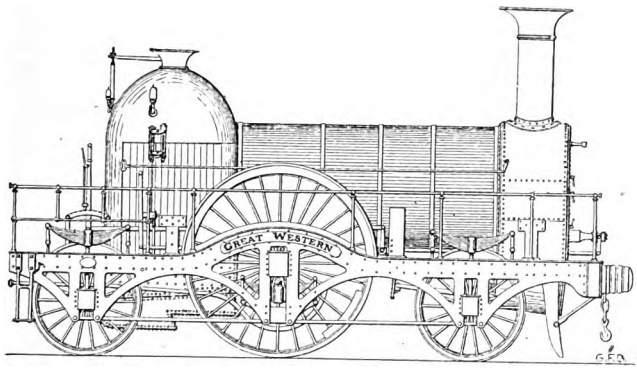
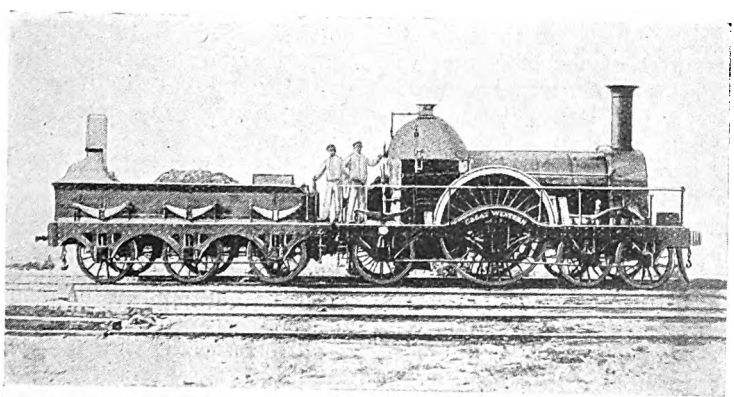


THE "GREAT WESTERN" IN 1846.



THE "GREAT WESTERN," AS A 4-2-2 ENGINE.

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enable one to read. To do so passengers carried a candle and ran the risk of greasing clothes and fittings.

First gas, and now electricity, several brilliant lights in one compartment make reading as easy as in a fireside armchair. Then the confinement in one compartment on a long journey, especially for ladies and children, was an ordeal that deterred people from making it. Now, the corridor gives convenience and security to old and young of both sexes. They can lunch, have tea and dine as in a hotel. All this is an everyday occurrence, but what has been the effect on railway revenue? It has meant, on the debit side, constant and heavy expenditure.

Two subjects that concerned a railway superintendent were safety and punctuality. The former gave much anxiety, where there was but one line of rails in use for trains going in both directions. To an older generation, I may mention Norwich (Thorpe) and Radstock, to the present Abermule, to illustrate what I am relating.

In 1891 there were 90 miles of single line in the Chester division. Out of the 32 stations thereon, at 12 only could one train pass another. Some were ten miles apart, with steep gradients intervening. To decide when trains were out of course, which was the better place for one to meet and pass another was at times almost a mathematical problem. At these lonely places, the transfer of the staff that insured safety meant, when trains were out of order, using a platelayers' trolley ; to send it by a man on a bicycle ; to employ a horse, if one could be got.

These means were used where practicable, but were not available in mountainous districts. A gain or loss of ten minutes in running might upset what had been arranged. In some cases the engine of a train on reaching the terminus was required to convey 300 workmen home, delay meant an hour's loss of time to these men. At one station, owing to distance and gradients, 40 minutes elapsed between the departure of one train and the arrival of another.

Mr. Parry, the District Inspector, prepared a plan daily for the working of the staffs in the several sections, but contingencies arose that often upset it. In the thirty years he was responsible, no accident occurred. Signalmen found the telephone useful, but a bell code was quicker. A few beats on a bell conveyed a distinct message.

In my time additional passing places were made, but the greatest relief was the introduction of an electric staff or tablet, which could be controlled by the signalmen in each section. When one staff was out another could not be drawn. From which instrument it should be taken could be agreed upon in a few seconds by the signalmen, in this way the passing places could be decided upon with certainty and safety.

To save trains having to stop to exchange staffs at places where they did not call, the fireman hung the staff for delivery on a horn projecting from a post near the line. From another post he could collect the forward staff by slipping his arm through a big ring attached to it. The contrast in the system of working a railway between 1864 and 1911 was between uncertainty and a safety that at one time seemed impossible.

Safety depends largely on the care and alertness of enginemen and signalmen. This was the method of selecting signalmen. The district inspectors chose promising young men from among the porters. When competent, the man was further examined by the divisional inspector. One day a month I saw candidates to discover how they would act in emergencies. If not satisfied, I asked them to come again next month. They used the interval to advantage, and were more ready and confident in their answers.

A very important matter with signalmen and engine drivers is colour vision. I had a signalman, none better, he could identify the colours of red and green books after dark, but when Dahlgren's wool test was introduced he could not distinguish between them. He was given a post unconnected with the working of the line.

Where there was new work or the main line had been affected by alterations, an inspection thereof was made by a representative of the Board of Trade. At these inspections the company's chief representative was Mr. A. T. Blackall, the signal engineer. His experience or intuition generally anticipated the inspector's requirements.

As new mechanical inventions were

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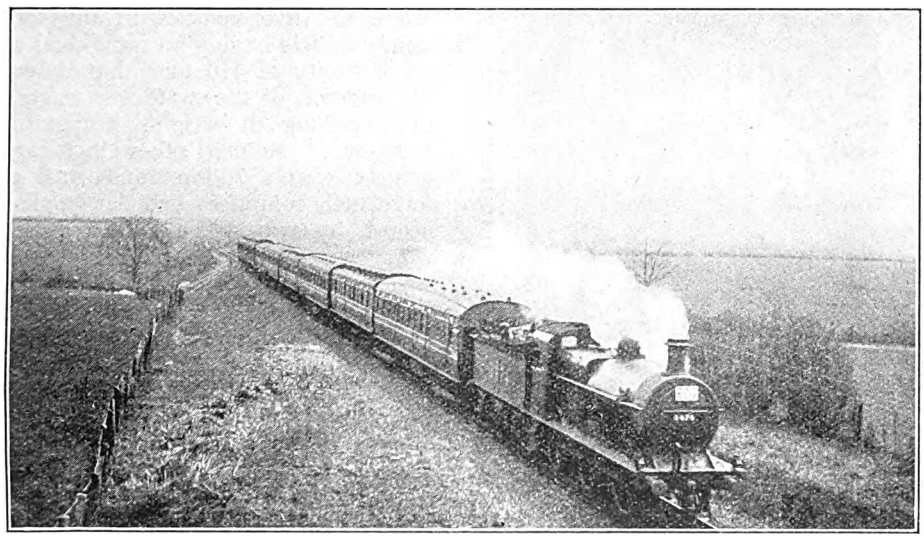
brought into use these inspections became more important. I saw the change from where one lever movement only was made in point working to where as many as 20 may be required to carry out one operation. Electricity has transformed the signalling system. One cabin may contain 300 levers, 8 inches high, which can be moved by a finger. It is a responsible task for an officer on behalf of the Government to inspect a cabin with several hundred levers in it and to certify that the mechanical arrangements are satisfactory. One operation may require the movement of 20 or more levers in different parts of the cabin. They must be so secured by a method of back locking that, while a signal is off for a train to pass, they are rigidly fixed. Although so complicated, the Government Inspectors gave their certificates with confidence.

(*To be continued.*)

(*Illustrations from E. T. McDermot's "History of the Great Western Railway."*)

A ONCE-A-YEAR TRAIN.

Mr. J. E. Kite sends the photograph reproduced, which shows a train passing over a section of the old Stratford-upon-Avon and Midland Junction Railway between Olney and Roade, which is used by passenger trains only once a year—on Easter Monday. The view is taken near the crossing of the old L.N.W. main line.



Mr. Kite writes: "It is a peculiar feeling of excitement, waiting to witness the passage of a passenger train that only travels this route once out and once back in twelve months. I believe night goods trains use this road. Several villagers turned out to view this train last Easter Monday, and were duly impressed."

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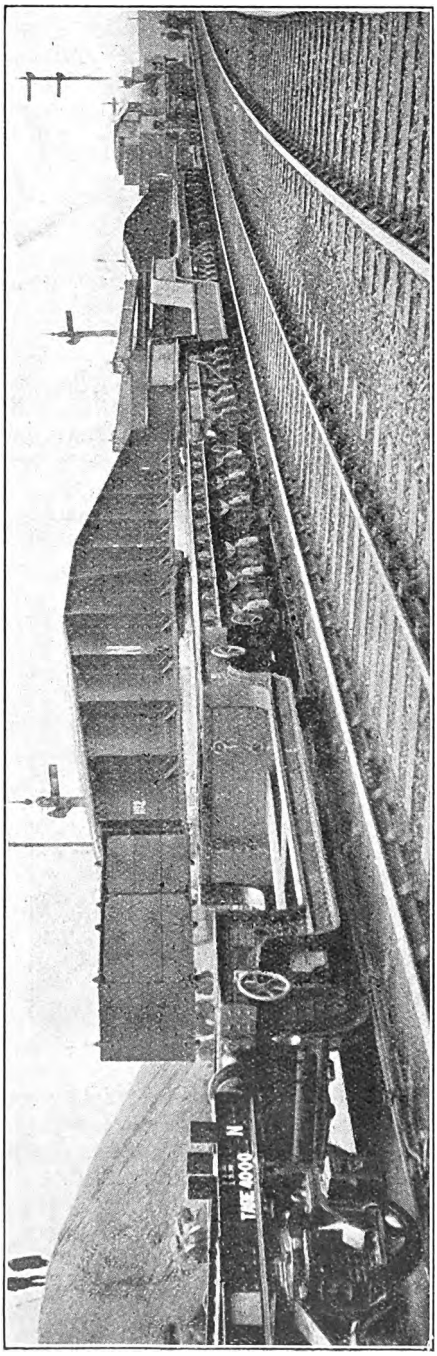
L.N.E.R. Demonstration Freight Train.



[Keystone.

L.N.E.R. DEMONSTRATION FREIGHT TRAIN, SHOWING GARRATT LOCOMOTIVE AND 150-TON CANTILEVER SET.

THIS was prepared in connection with a meeting of the Sheffield Rotary Club, on March 31, when Mr. W. M. Gracie, Assistant Goods Manager, L.N.E.R. (Southern Area), gave an address on "The Railway and the Trader." The train was hauled through Sheffield passenger station and then temporarily halted at the up main platform for examination by the visitors. It comprised 20 units, and was headed by the Garratt engine, weighing 178 tons, temporarily detached from its banking duties on the heavily graded Worsborough Branch. The leading feature of the train was the 150-ton cantilever set. Described on the programme as "the leviathan of the line," this 150-ton set is the most powerful in the country. There are five vehicles in the set, the centre vehicle having an individual carrying capacity of 110 tons, but it requires the addition of the cantilever wagons for the handling of weights amounting to 150 tons. Among other high-capacity vehicles were a 70-ton transformer girder set, which comprises two flat trucks connected by two detachable girders from which the load is suspended; a 55-ton well-trolley wagon; a 40-ton bolster wagon; and a 30-ton trestle trolley wagon designed for the conveyance of heavy traffic with awkward dimensions. The remaining units, all of different types, included wagons used on the train-ferry, a 40-ton brick wagon, a banana wagon and various types of container, the last being a standard 20-ton brake van.

The 20 units had a tare weight of 456 tons, and comprised a total length of 909 ft., this being the maximum length of train which it was possible to "lock in" the up main platform line at Sheffield. The different classes of vehicles on the train were well selected, and the whole probably represented a train formation unique in the annals of British railroading, and it was fitting that it should have been provided by one of the great freight-carrying lines in the country.

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Present-Day Locomotives of the L.M.S.R. [No. II.]

SUPPLEMENTING particulars of the numbers allocated to engines of various classes given last month (these were series allocations without attention to incidental variations, numbers now blank and other details which will receive attention later), we now give a list of all L.M.S. engines which bear names.

2-6-4T Class.

L.M.S. No.	L.N.W. No.	Name.
2313	—	*The Prince.*

"Precedent" (2-4-0) Class (6 ft. 6 in.).

5000	2190	*Princess Beatrice.*
1	2191	*Snowden.*
2	1170	*General.*
5	1522	*Pitt.*
5011	696	*Director.*
2	1211	*John Ramsbottom.*
4	1488	*Murdock.*
8	1672	*Talavera.*
5020	1674	*Delhi.*
1	2006	*Princess.*
3	1668	*Dagmar.*
7	152	*Franklin.*
9	1684	*Speke.*
5031	790	*Hardwicke.*
2	1213	*The Queen.*
4	1745	*Glowworm.*
5041	2005	*Lynx.*
2	1173	*The Auditor.*
5	265	*Thomas Carlyle.*
8	364	*Henry Pease.*
5050	860	*Merry Carlisle.*
3	945	*Humphrey Davy.*
4	2683	*Antelope.*
5062	506	*Sir Alexander Cockburn.*
4	1187	*Chandos.*
8	1194	*Miranda.*
9	2187	*Penrith Beacon.*
5070	262	*Wheatstone.*
5	862	*Balmoral.*

"Waterloo" (2-4-0) Class (6 ft.).

5084	642	*Bee.*
7	604	*Narcissus.*
5092	763	*Violet.*
5	628	*Tartarus.*
5102	1168	*Cuckoo.*
4	794	*Woodlark.*

"Renown" (4-4-0) Class.

5110	1903	*Iron Duke.*
2	1911	*Centurion.*
3	1912	*Colossus.*
6	1927	*Goliath.*
7	1929	*Polyphemus.*
5121	1954	*Galatea.*
3	1964	*Ceasar.*
6	1969	*Dominion.*
9	1977	*Mars.*
5133	1935	*Collingwood.*
5	1971	*Euryalus.*
7	1905	*Black Diamond.*
8	1946	*Diadem.*
9	1945	*Magnificent.*
5141	1948	*Camperdown.*
2	1930	*Ramillies.*
5143	1959	*Revenge.*
4	1257	*Invincible.*
9	1906	*Robin Hood.*
5152	1949	*King Arthur.*
5	1916	*Irresistible.*
6	1901	*Diamond Jubilee.*
7	1902	*Black Prince.*
5165	1934	*Blenheim.*
6	1920	*Flying Fox.*
5170	1940	*Trafalgar.*
2	1910	*Cavalier.*
3	1928	*Glatton.*
6	1931	*Agincourt.*
7	1938	*Merlyn.*
9	1941	*Alfred the Great.*
5180	1926	*La France.*
2	1980	*Neptune.*
3	1924	*Powerful.*
4	1917	*Inflexible.*
5	1942	*King Edward VII.*
6	1950	*Victorian.*

"Precursor" (4-4-0) Class.

7	2033	*Helvellyn.*
8	412	*Marquis.*
9	510	*Albatross.*
5192	685	*Cossack.*
3	1102	*Thunderbolt.*
4	1117	*Vandal.*
6	638	*Huskisson.*
7	645	*Mammoth.*
8	40	*Niagara.*
9	1184	*Cedric.*
5200	1111	*Cerberus.*
1	1431	*Egeria.*
2	520	*Panopea.*
3	2031	*Waverley.*
4	184	*Havelock.*
6	1545	*Cyclops.*
7	2061	*Eglinton.*
8	519	*Messenger.*
5210	1430	*Victor.*
1	113	*Aurania*
2	315	*Harrowby*
3	311	*Emperor*
5	2257	*Vulture*
6	911	*Herald*
7	1114	*Knowsley*
8	1116	*Pandora.*
5219	2120	*Psyche.*
5220	1784	*Python.*
1	2202	*Vizier.*
2	117	*Alaska.*
3	127	*Snake.*
5	1301	*Candidate*
6	1396	*Harpy.*
8	2012	*Penguin.*
9	2115	*Servia.*

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L.M.S. No.	L.N.W. No.	Name.
5230	2576	*Arab.*
1	2579	*Ganymede.*
2	2560	*Problem.*
3	2581	*Peel.*
5	2583	*Moonstone.*
6	2585	*Watt.*
7	234	*Pearl.*
9	723	*Coptic.*
5240	837	*Friar.*
1	1311	*Napoleon.*
2	1312	*Ionic.*
3	1642	*Lapwing.*
4	2017	*Tubal.*
5	561	*Antaeus.*
6	675	*Adjutant.*
8	804	*Amphion.*
9	988	*Bellerophon.*
5250	1433	*Faerie Queen.*
2	1787	*Hyperion.*
3	1	*Clive.*
4	218	*Daphne.*
5	419	*Monarch.*
7	1011	*Locke.*
8	1364	*Clyde.*
9	2053	*Edith.*
5260	2181	*Eleanor.*
2	754	*Celtic.*
3	807	*Oceanic.*
5	1297	*Phalaris.*
6	1516	*Alecto.*
5270	469	*Marmion.*
1	802	*Gaelic.*
2	1363	*Brindley.*
3	2064	*Jason.*
4	688	*Hecate.*
5	1439	*Tiger.*
6	7	*Titan*
7	2164	*Oberon.*
8	513	*Precursor.*
9	2062	*Sunbeam.*
5280	2166	*Shooting Star.*
1	564	*Erebus.*
2	565	*Champion.*
3	2811	*Brougham.*
4	433	*Ambassador.*
5	1469	*Tamerlane.*
5286	1573	*Dunrobin.*
7	365	*Alchymist.*
8	1469	*Tantalus.*
9	301	*Leviathan.*
5290	310	*Achilles.*
1	1395	*Harbinger.*
2	366	*Medusa.*
3	2563	*Levens.*
4	106	*Druid.*
5	1723	*Scorpion.*
6	659	*Dreadnought.*
7	643	*Sirocco.*
8	60	*Dragon.*
9	1137	*Vesuvius.*
5300	1617	*Hydra.*
1	300	*Emerald.*
2	1309	*Shamrock.*
3	321	*Argus.*
4	302	*Greyhound.*
5	303	*Himalaya.*
6	6387	*Lang Meg*
7	305	*Senator.*
8	2	*Simoon.*
9	2578	*Fame.*

L.M.S. No.	L.N.W. No.	Name.
5310	1120	*Thunderer.*
1	811	*Express.*
2	2584	*Velocipede.*
3	2577	*Etna.*
4	282	*Alaric.*
5	2051	*Delamere.*
6	1737	*Viscount.*
7	374	*Empress.*
8	806	*Swiftsure.*
9	990	*Bucephalus.*

"George the Fifth" (4-4-0) Class.

5320	2663	*George the Fifth.*
1	1059	*Lord Loch.*
2	1294	*F. S. P. Wolferstan.*
3	1583	*Henry Ward.*
4	1725	*John Bateson.*
5	2025	*Sir Thomas Brooke.*
6	2155	*W. G. Brocklehurst.*
7	228	*E. Nettlefold.*
8	445	*P. H. Chambers.*
9	2664	*Queen Mary.*
5330	1550	*Westminster.*
1	2271	*J. P. Bickersteth.*
2	896	*George Whale.*
3	1559	*Drake.*
4	2151	*Newcomen.*
5	2507	*Miles McInnes.*
6	238	*F. W. Webb.*
7	1195	*T. J. Hare.*
8	2512	*Thomas Houghton.*
9	2165	*Henry Maudslay.*
5340	956	*Bull Dog.*
1	1489	*Wolfhound.*
2	1554	*Boarhound.*
3	1513	*Otterhound.*
4	1532	*Bloodhound.*
5	1628	*Foxhound.*
6	1662	*Deerhound.*
7	1706	*Elkhound.*
8	1800	*Coronation.*
9	502	*British Empire.*
5350	868	*India.*
1	882	*Canada.*
2	1218	*Australia.*
3	1792	*Staghound.*
4	2081	*New Zealand.*
5	2212	*South Africa.*
6	2291	*Gibraltar.*
7	2495	*Bassethound.*
8	2177	*Malta.*
9	2498	*Cyprus.*
5360	361	*Beagle.*
1	888	*Challenger.*
2	1360	*Fire Queen.*
3	1394	*Harrier.*
4	1623	*Nubian.*
5	1631	*Racehorse.*
6	1644	*Roebuck.*
7	2089	*Traveller.*
8	2494	*Perseus.*
9	1371	*Quail.*
5370	1417	*Landrail.*
1	1472	*Moor-hen.*
2	1595	*Wild Duck.*
3	1681	*Ptarmigan.*
4	2220	*Vanguard.*
5	1713	*Partridge.*
6	1730	*Snipe.*
7	1733	*Grouse.*

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L.M.S. No.	L.N.W. No.	Name.
5378	1777	*Widgeon.*
9	1799	*Woodcock.*
5380	82	*Charles Dickens.*
1	752	*John Hick.*
2	2124	*John Rennie.*
3	89	*John Mayall.*
4	132	*S. R. Graves.*
5	1138	*William Froude.*
6	1193	*Edward Tootal.*
7	2154	*William Siemens.*
8	2282	*Richard Arkwright.*
9	404	*Eclipse.*
5390	681	*St. George.*
1	845	*Saddleback.*
2	1188	*Penmaenmawr.*
3	1680	*Loyalty.*
4	2086	*Phaeton.*
5	2279	*Henry Crosfield.*
6	1481	*Typhon.*
7	2197	*Planet.*
8	2242	*Meteor.*
9	2428	*Lord Stalbridge*
5400	363	*Llandudno.*
1	789	*Windermere.*
2	984	*Carnarvon.*
3	104	*Leamington Spa.*
4	226	*Colwyn Bay.*
5	1086	*Conway.*
6	2153	*Llandrindod.*
7	2233	*Blackpool.*
8	2106	*Holyhead.*
9	2370	*Dovedale.*

"Experiment" (4-6-0) Class.

5450	66	*Experiment.*
1	306	*Autocrat.*
2	353	*Britannic.*
4	507	*Sarmatian.*
6	893	*City of Chester.*
7	1074	*City of Dublin.*
8	1357	*City of Edinburgh.*
9	165	*City of Lichfield.*
5460	828	*City of Liverpool.*
1	978	*City of London.*
2	1405	*City of Manchester.*
4	1669	*City of Glasgow.*
6	1987	*Glendower.*
9	1990	*North Western.*
5471	1992	*President.*
2	1993	*Richard Moon.*
3	1994	*Scottish Chief.*
4	61	*Atalanta.*
5	222	*Ivanhoe.*
6	291	*Leander.*
7	667	*Mazeppa.*
8	1304	*Prometheus.*
9	1676	*Shakespeare.*
5482	2027	*Queen Empress.*
3	2052	*Stephenson.*
4	2269	*William Cawkwell.*
5	1496	*Harlequin.*
7	902	*Combermere.*
8	937	*Princess Alice.*
5490	2112	*Victoria.*
1	1135	*Prince George.*
5	884	*Greater Britain.*
6	887	*Fortuna.*
7	1020	*Majestic.*
8	1483	*Red Gauntlet.*
9	1490	*Wellington.*

L.M.S. No.	L.N.W. No.	Name.
5500	1553	*Faraday.*
2	2076	*Pheasant.*
4	2621	*Ethelred.*
6	2623	*Lord of the Isles.*
8	2625	*Buckland.*
9	2626	*Chillington.*
5511	2625	*Banshee.*
3	2630	*Buffalo.*
4	1406	*George Findlay.*
8	1566	*John Penn.*
9	1603	*Princess Alexandra.*
5520	1649	*Sisyphus.*
2	1781	*Lightning.*
3	2022	*Marlborough.*
4	2637	*Babylon.*
5	2638	*Byzantium.*
6	2639	*Bactria.*
8	2641	*Bellona.*
9	2642	*Berenice.*
5531	2644	*Berengaria.*
2	2645	*Britomart.*
4	1412	*Bedfordshire.*
5	1418	*Cheshire.*
6	1420	*Derbyshire.*
7	1455	*Herefordshire.*
9	1616	*Lancashire.*
5542	677	*Staffordshire.*
3	1002	*Warwickshire.*
5	1624	*Leicestershire.*
6	1652	*Middlesex.*
7	1689	*Monmouthshire.*
8	1703	*Northumberland.*
9	1481	*Worcestershire.*
5551	1618	*Carnarvonshire.*
2	1621	*Denbighshire.*
3	1658	*Flintshire.*

"Prospero" (4-6-0) Class.

4	1361	*Prospero.*

"Prince of Wales" (4-6-0) Class.

5600	819	*Prince of Wales.*
1	1388	*Andromeda.*
2	1452	*Bonaventure.*
3	1454	*Coquette.*
4	1537	*Enchantress.*
5	1691	*Pathfinder.*
6	1704	*Conqueror.*
7	1721	*Defiance.*
8	2021	*Wolverine.*
9	2359	*Hermione.*
5610	362	*Robert Southey.*
1	892	*Charles Wolfe.*
2	1081	*John Keats.*
3	1089	*Sydney Smith.*
4	1134	*Victor Hugo.*
5	2040	*Oliver Goldsmith.*
6	2075	*Robert Burns.*
7	321	*Henry W. Longfellow.*
8	479	*Thomas B. Macauley.*
9	951	*Bulwer Lytton.*
5620	2198	*John Ruskin.*
1	2205	*Thomas Moore.*
2	2213	*Charles Kingsley.*
3	1679	*Lord Byron.*
4	2249	*Thomas Campbell.*
5	2283	*Robert L. Stevenson.*
6	86	*Mark Twain.*
7	146	*Lewes Carroll.*
8	307	*R. B. Sheridan.*
9	637	*Thomas Gray.*

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L.M.S. No.	L.N.W. No.	Name.
5630	979	*W. M. Thackeray.*
1	1400	*Felicia Hemans.*
2	964	*Bret Harte.*
3	985	*Sir W. S. Gilbert.*
4	1321	*William Cowper.*
5	2152	*Charles Lamb.*
6	2293	*Percy Bysshe Shelley.*
7	2377	*Edward Gibbon.*
8	2443	*Charles James Lever.*
9	2520	*G. P. Neele.*
5640	27	*General Joffre.*
1	88	*Czar of Russia.*
2	122	*King of the Belgians.*
3	160	*King of Serbia.*
4	185	*King of Italy.*
5	877	*Raymond Poincare.*
6	1333	*Sir John French.*
7	2275	*Edith Cavell.*
8	2396	*Queen of the Belgians.*
9	2408	*Admiral Jellicoe.*
5650	606	*Castor.*
1	745	*Pluto.*
2	810	*Onyx.*
3	1352	*The Nile.*
4	1379	*Witch.*
5	1484	*Smeaton.*
6	1084	*Shork.*
7	1346	*Trent.*
8	2417	*Atlas.*
9	2442	*Odin.*
5660	90	*Kestrel.*
1	95	*Gallipoli.*
2	126	*Anzac.*
3	136	*Minerva.*
4	173	*Livingstone.*
5	233	*Suvla Bay.*
6	257	*Plynlimmon.*
7	401	*Zamiel.*
8	446	*Pegasus.*
9	525	*Vulcan.*
5670	610	*Albion.*
1	849	*Arethusa.*
2	867	*Condor.*
3	1100	*Lusitania.*
4	1132	*Scott.*
5	1466	*Sphinx.*
6	1744	*Petrel.*
7	1749	*Precedent.*
8	2055	*Milton.*
9	2063	*Hibernia.*
5680	2175	*Loadstone.*
1	2203	*Falstaff.*
2	2339	*Samson.*
3	1324	*Falaba.*
4	2092	*Arabic.*
5	2276	*Persia.*
6	2295	*Anglia.*
7	2300	*Hotspur.*
8	2340	*Tara.*
9	2392	*Caliban.*
5697	940	*Richard Cobden.*
5700	621	*Telford.*
4	6584	*Scotia.*
6	564	*Canning.*
7	974	*Hampden.*
5723	522	*Stentor.*
9	1290	*Lucknow.*
5736	1325	*Disraeli.*
5743	1178	*Prince Albert.*
5750	1542	*Marathon.*
5753	1694	*Premier.*
4	2516	*Dalton.*

"Claughton" (4-6-0) Class.

L.M.S. No.	L.N.W. No.	Name.
5900	2222	*Sir Gilbert Claughton.*
1	1161	*Sir Robert Turnbull.*
2	1191	*Sir Frank Ree.*
3	21	*Duke of Sutherland.*
4	163	*Holland Hibbert.*
5	650	*Lord Rathmore.*
6	1159	*Ralph Brocklebank.*
7	1319	*Sir Frederick Harrison.*
8	1327	*Alfred Fletcher.*
9	2046	*Charles N. Lawrence.*
5910	250	*J. A. Bright.*
1	260	*W. E. Dorrington.*
2	1131	*Lord Faber.*
3	1429	*Colonel Lockwood.*
4	209	*J. Bruce Ismay.*
5	668	*Rupert Guiness.*
6	856	*E. Tootal Broadhurst.*
7	1567	*Charles J. Cropper.*
8	2239	*Frederick Baynes.*
9	2401	*Lord Kitchener.*
5920	511	*George Macpherson.*
1	695	*Sir Arthur Lawley.*
2	968	*Lord Kenyon.*
3	1093	*Sir Guy Calthrop.*
4	1345	*James Bishop.*
5	2174	*E. C. Trench.*
6	2204	*Sir Herbert Walker, K.C.B.*
7	2221	*Sir Francis Dent.*
8	2338	*Charles H. Dent.*
9	2395	*J. A. F. Aspinall.*
5930	37	*G. R. Jebb.*
1	154	*Captain Fryatt.*
2	155	*Sir Thomas Williams.*
9	2230	*Clio.*
5940	1019	*Columbus.*
3	2373	*Tennyson.*
5	2420	*Ingestre.*
6	2427	*Duke of Connaught.*
8	2445	*Baltic.*
5953	986	*Buckingham.*
5964	1914	*Patriot.*
6	1177	*Bunsen.*
7	1407	*L./Corpl. J. A. Christie, V.C.*
8	1599	*John O'Groat.*
5970	2499	*Patience.*
1	2511	*Croxteth.*
5	62	*Talisman.*
9	2268	*Frobisher.*
5991	2059	*C. J. Bowen Cooke.*
9	2430	*Vindictive.*
6002	30	*Thalaba.*
4	42	*Princess Louise.*
8	110	*Lady Godiva.*
6011	150	*Illustrious.*
6015	158	*Private E. Sykes, V.C.*
7	169	*Breadalbane.*
8	179	*Private W. Wood, V.C.*
9	180	*Llewellyn.*
6021	192	*Bevere.*
3	207	*Sir Charles Cust.*

"Royal Scot" (4-6-0) Class.

No.	Name.
6100	*Royal Scot.*
1	*Royal Scots Grey.*
2	*Black Watch.*
3	*Royal Scots Fusilier.*

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No.	Name.
6104	*Scottish Borderer.*
5	*Cameron Highlander.*
6	*Gordon Highlander.*
7	*Argyll & Sutherland Highlander.*
8	*Seaforth Highlander.*
9	*Royal Engineer.*
6110	*Grenadier Guardsman.*
1	*Royal Fusilier.*
2	*Sherwood Forester.*
3	*Cameronian.*
4	*Coldstream Guardsman.*
5	*Scots Guardsman.*
6	*Irish Guardsman.*
7	*Welsh Guardsman.*
8	*Royal Welch Fusilier.*
9	*Lancashire Fusilier.*
6120	*Royal Inniskilling Fusilier.*
1	*H.L.I.*
2	*Royal Ulster Rifleman.*
3	*Royal Irish Fusilier.*
4	*London Scottish.*
5	*Lancashire Witch.*
6	*Sanspareil.*
7	*Novelty.*
8	*Meteor.*
9	*Comet.*
6130	*Liverpool.*
1	*Planet.*
2	*Phœnix.*
3	*Vulcan.*
4	*Atlas.*
5	*Samson.*
6	*Goliath.*
7	*Vesta.*
8	*The London Irish Rifleman.*
9	*Ajax.*
6140	*Hector.*
1	*Caledonian.*
2	*Lion.*
3	*Mail.*
4	*Ostrich.*
5	*Condor.*
6	*Jenny Lind.*
7	*Courier.*
8	*Velocipede.*
9	*Lady of the Lake.*

No. 3020, *Cornwall*, 8-ft. 6-in. single driving wheels. Attached to Mechanical Engineer's Coupé.

This engine not included in locomotive stock.

Highland Outside Cylinder 4-4-0's.

L.M.S. No.	Old No.	Name.
14271	89	*Sir George.*
2	92A	*Strathdearn.*
4	95	*Strathcarron.*
5	98	*Glentruim.*
6	100	*Glen Bruar.*
14379	119	*Loch Insh.*
14380	120	*Loch Ness.*
1	121	*Loch Ericht.*
2	122	*Loch Moy.*
3	123	*Loch-an-Dorb.*
4	124	*Loch Laggan.*
5	125	*Loch Tay.*
6	126	*Loch Tummel.*
7	127	*Loch Garry.*
8	128	*Loch Luichart.*
9	129	*Loch Maree.*
14390	130	*Loch Fannich.*
14391	131	*Loch Shin.*
2	132	*Loch Navar.*
3	133	*Loch Laoghal.*
4	70	*Loch Ashie.*
5	71	*Loch Garve.*
6	72	*Loch Ruthven.*

Highland "Ben" (4-4-0) Class (Small).

14397	1	*Ben-Y-Gloe.*
8	2	*Ben Alder.*
9	3	*Ben Wyvis.*
14400	4	*Ben More.*
1	5	*Ben Vrackie.*
2	6	*Ben Armin.*
3	7	*Ben Attow.*
4	8	*Ben Clebrig.*
5	9	*Ben Rinnes.*
6	10	*Ben Sliochd.*
7	11	*Ben Macdhui.*
8	12	*Ben Hope.*
9	13	*Ben Alisky.*
14410	14	*Ben Dearg.*
1	15	*Ben Loyal.*
2	16	*Ben Avon.*
3	17	*Ben Alligan.*
4	38	*Ben Udlaman.*
5	41	*Ben Bhach Ard.*
6	47	*Ben A'Bhuird.*

Highland "Ben" (4-4-0) Class (Large).

14417	61	*Ben Na Caillach.*
8	63	*Ben Mheadoin.*
9	64	*Ben Mholach.*
14420	65	*Ben A'Chait.*
1	60	*Ben Bhreac 'Mhor.*
2	62	*Ben Na Chaoruinn.*

G. & S.W. 4-Cylinder 4-4-0.

14509	394	*Lord Glenarthur.*

Highland "Durn" Class (4-4-0).

14522	73	*Snaigow.*
3	74	*Durn.*

Highland "Castle" (4-6-0) Class.

14675	140	*Taymouth Castle.*
6	141	*Ballindalloch Castle.*
7	142	*Dunrobin Castle.*
8	143	*Gordon Castle.*
9	144	*Blair Castle.*
14680	145	*Murthly Castle.*
1	146	*Skibo Castle.*
2	147	*Beaufort Castle.*
3	148	*Cawdor Castle.*
4	149	*Duncraig Castle.*
5	30	*Dunvegan Castle.*
6	35	*Urquhart Castle.*
7	26	*Brahan Castle.*
8	27	*Thurso Castle.*
9	28	*Cluny Castle.*
14690	29	*Dalcross Castle.*
1	50	*Brodie Castle.*
2	58	*Darnaway Castle.*
3	59	*Fowlis Castle.*

Highland "Clan" (4-6-0) Class.

14762	49	*Clan Campbell.*
3	51	*Clan Fraser.*
4	52	*Clan Munro.*
5	53	*Clan Stewart.*
6	54	*Clan Chattan.*
7	55	*Clan MacKinnon.*
8	56	*Clan MacKenzie.*
9	57	*Clan Cameron.*

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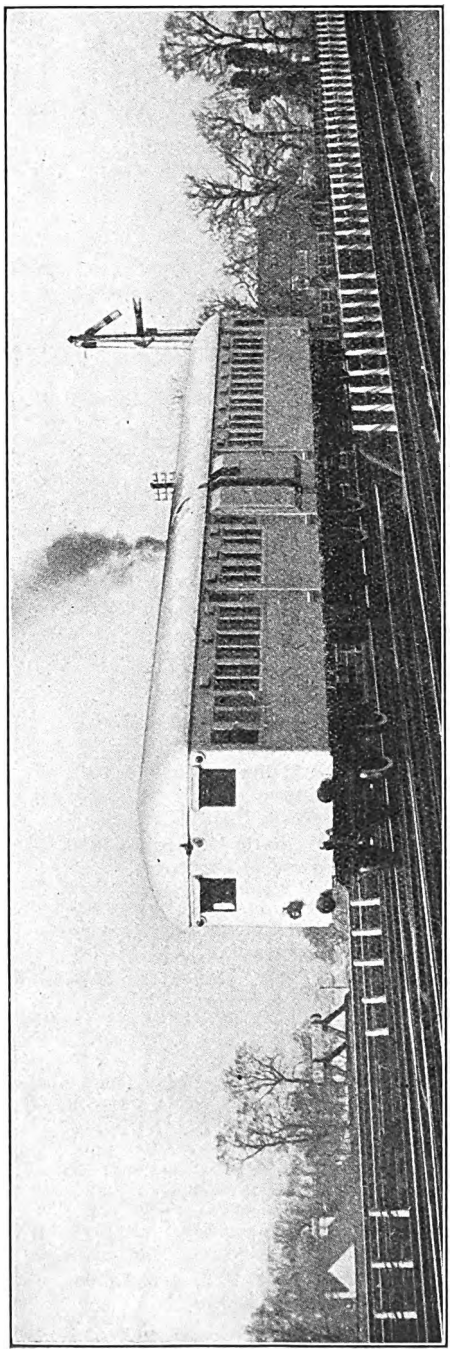

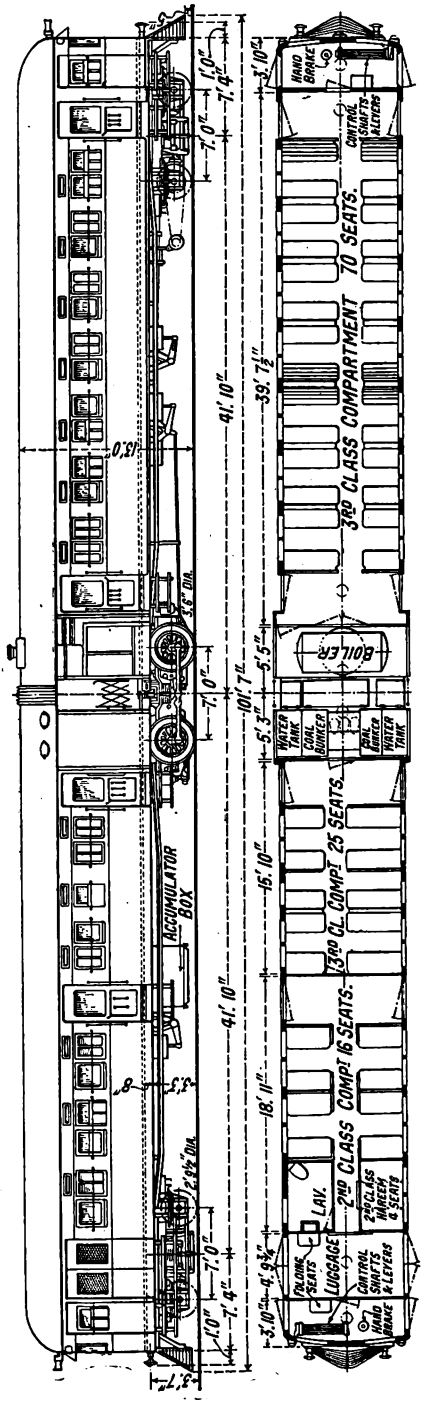

ARTICULATED STEAM RAIL CAR FOR THE EGYPTIAN STATE RAILWAYS ON DEMONSTRATION RUN ON THE METROPOLITAN RAILWAY.

A New Design built by the Birmingham Railway Carriage & Wagon Co. Ltd.

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Electric Train Head Codes, Southern Railway.

As new stages of electrification were brought into use we gave in many instances the head codes adopted for new services. In a few cases, however, changes have been made. For example, it was found desirable that the signalman at Orpington should be able to distinguish the starting points of trains terminating there in view of return workings, and for that reason, a dot, double dot or dash were superimposed over the "O." Similarly, it was found desirable to adopt a separate letter for trains terminating at Bickley, whilst for the London Bridge-Victoria trains over the South London lines numerals are now used. We understand, further, that numerals will be used between West Croydon and Wimbledon, and that future developments are likely to favour the use of numerals instead of letters.

We are indebted to the Publicity and Traffic Officers of the Southern Railway for the following up-to-date particulars and for the further information given above, which together provide answers to several queries which have reached us.

WESTERN SECTION.

Services.

Passenger Trains.

(Regular Services.)	Code.
Waterloo (M.L.) to Waterloo (W.L.) (via Teddington)	V
Waterloo (W.L.) to Waterloo (M.L.) (via Teddington)	$\overline{V}$
Waterloo and Dorking	I
Waterloo and Effingham Junction (via Epsom)	$\overline{I}$
Waterloo and Guildford (via Cobham)	$\overline{H}$
Waterloo and Hampton Court	H
Waterloo and Shepperton (via Wimbledon)	S
Waterloo and Shepperton (via Richmond)	$\overline{S}$
Waterloo and Waterloo (via Hounslow–Richmond)	O
Waterloo and Waterloo (via Richmond–Hounslow)	$\overline{O}$
Waterloo and Wimbledon (via East Putney)	P

Passenger Trains.

(Special Workings.)	Code.
Hampton Court to Waterloo (via East Putney)	P
Shepperton to Waterloo (via East Putney)	P
Waterloo to Wimbledon Park	$\overline{P}$

Empty Trains.

Waterloo to Durnsford Road (via Wimbledon West Box or Raynes Park) Effingham Junction to Durnsford Road Hampton Court to Durnsford Road Shepperton to Durnsford Road Teddington or Strawberry Hill to Durnsford Road Waterloo to Wimbledon Park (via East Putney)	$\underline{\square}$
Durnsford Road to Waterloo* Wimbledon Park to Waterloo (via East Putney) Strawberry Hill to Waterloo (via Earlsfield) Teddington or Strawberry Hill to Waterloo (via Richmond) Hounslow to Waterloo (via Richmond) Hounslow to Waterloo (via Brentford)	$\ddot{\underline{\square}}$
Shepperton to Waterloo (via East Putney) Hampton Court to Waterloo (via East Putney)	$\ddot{P}$
Waterloo to Shepperton (via Richmond) Durnsford Road to Shepperton Strawberry Hill to Shepperton	$\ddot{S}$
Waterloo to Hampton Court (via Earlsfield) Durnsford Road to Hampton Court Guildford and Effingham Junction	$\ddot{H}$
Waterloo to Teddington or Strawberry Hill (via Earlsfield) Durnsford Road to Teddington or Strawberry Hill Waterloo to Strawberry Hill (via Richmond) Shepperton to Strawberry Hill	$\ddot{V}$
Waterloo to Hounslow (via Brentford)	$\ddot{O}$
Durnsford Road to Effingham Junction (via Epsom)	$\ddot{I}$
Wimbledon Park to Wimbledon Park Sidings	$\overline{P}$
Wimbledon Park Sidings to Wimbledon Park	P
* Empty trains ex Durnsford Road stopping at Earlsfield and stations to Waterloo to pick up passengers	$\ddot{V}$

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Central Section.

Services.	Code.
*Charing Cross and Tattenham Corner	S̈
*Charing Cross and Caterham	L̈
*Cannon Street and Tattenham Corner	Ṡ
*Cannon Street and Caterham	L̇
*London Bridge and Tattenham Corner	T̈
*London Bridge and Caterham	Ḣ
*Purley and Caterham (Shuttle service only)	P
*Purley and Tattenham Corner (Shuttle service only)	Ṗ
London Bridge and Coulsdon North (via Forest Hill)	İ
London Bridge and Coulsdon North (via Tulse Hill and Crystal Palace) ..	Ï
London Bridge and Dorking North (via Mitcham Junction)	L̇
London Bridge and Effingham Junction (via Mitcham Junction)	L̈
London Bridge to London Bridge (via Sydenham, Crystal Palace, and Tulse Hill)	Ṗ
London Bridge to London Bridge (via Tulse Hill, Crystal Palace, and Sydenham)	P̈
London Bridge and Epsom (via Norwood Junction and West Croydon)	Λ̇
London Bridge and Epsom Downs (via Norwood Junction and West Croydon)	Ȯ
London Bridge and Wallington (via Norwood Junction and West Croydon)	Ö
London Bridge to London Bridge (via Norwood Junction, Thornton Heath, Tulse Hill)	V̇
London Bridge to London Bridge (via Tulse Hill, Thornton Heath, and Norwood Junction)	V̈
London Bridge to Victoria (via South London Line)	2
London Bridge to Victoria (via Tulse Hill and Streatham Hill)	H
London Bridge and Streatham Hill (via Sydenham and Crystal Palace) ..	Λ̈
East Croydon and Victoria (via Selhurst and Streatham Common)	T̄
Holborn, Wimbledon, and Sutton (via Herne Hill and Tulse Hill)	Ḣ
Victoria and Beckenham Junction (via Streatham Hill and Crystal Palace) ..	P
Victoria and Coulsdon North (via Streatham Common and East Croydon) ..	I
Victoria and Crystal Palace (via Streatham Common, Selhurst, and Norwood Junction)	H̄
Victoria and Epsom and Dorking North (via Mitcham Junction)	V
Victoria to London Bridge (via Streatham Hill and Tulse Hill)	Ḣ
Victoria to London Bridge (via South London Line)	2
Victoria and East Croydon (via Streatham Hill and Crystal Palace)	T̄
Victoria and Sutton (via Streatham Common and West Croydon)	S
Victoria and West Croydon (via Streatham Hill and Crystal Palace)	P̄

* Rear portions of combined down trains for Tattenham Corner and Caterham carry through Code from Purley to destination and not shuttle service Code.

Eastern Section.

Services.	Code.
*Charing Cross to Tattenham Corner ..	S̈
*Charing Cross to Caterham	L̈
Charing Cross or Cannon Street to Addiscombe or Stations short thereof (via Lewisham)	T
Charing Cross or Cannon Street to Addiscombe or Stations short thereof (via Park's Bridge)	T̄
Charing Cross or Cannon Street to Beckenham Junction (via Lewisham) ..	I
Charing Cross or Cannon Street to Beckenham Junction (via Park's Bridge) ..	Ī
Charing Cross or Cannon Street to Hayes (via Lewisham)	H
Charing Cross or Cannon Street to Hayes (via Park's Bridge)	H̄
Charing Cross or Cannon Street to Bromley North	Ō
Charing Cross or Cannon Street to Orpington or Stations short thereof (via Chislehurst)	O
Charing Cross or Cannon Street to Dartford or Stations short thereof (via Greenwich)	V
Charing Cross or Cannon Street to Dartford or Stations short thereof (via North Kent (Blackheath and Charlton))	P
Charing Cross or Cannon Street to Dartford or Stations short thereof (via Bexleyheath)	S
Charing Cross or Cannon Street to Dartford or Stations short thereof (via Loop Line)	L
Charing Cross or Cannon Street to Charing Cross or Cannon Street (via Slades Green and Barnehurst (roundabout))	†
*Cannon Street to Tattenham Corner ..	Ṡ
*Cannon Street to Caterham	L̇
*London Bridge to Tattenham Corner ..	T̈
*London Bridge to Caterham	Ḣ

† Greenwich or North Kent (via Blackheath and Charlton) Code to Plumstead, or Bexleyheath Line Code to Barnehurst, as the case may be, on the Down journey, and the code changed according to route and destination on the Up journey.

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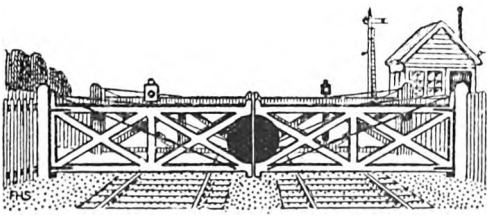
Services.	Code.
Victoria to Orpington (via Herne Hill) ..	$\dot{O}$
Holborn or St. Paul's to Orpington (via Herne Hill)	$\ddot{O}$
Victoria, Holborn, or St. Paul's to Bickley (via Herne Hill)	L
Victoria, Holborn, or St. Paul's to Orpington or intermediate Stations (via Catford Loop)	$\overline{O}$
Victoria, Holborn, or St. Paul's to Crystal Palace	P
Holborn to Sutton (via Herne Hill, Tulse Hill, and Wimbledon)	$\dot{H}$
Victoria to Sutton (via Herne Hill, Tulse Hill, and Wimbledon)	$\dot{I}$
Addiscombe to Charing Cross (via Lewisham)	$\overline{T}$
Addiscombe to Cannon Street (via Lewisham)	T
Addiscombe to Charing Cross (via Park's Bridge)	$\ddot{T}$
Addiscombe to Cannon Street (via Park's Bridge)	$\dot{T}$
Beckenham Junction to Charing Cross (via Lewisham)	$\overline{I}$
Beckenham Junction to Cannon Street (via Lewisham)	I
Beckenham Junction to Charing Cross (via Park's Bridge)	'
Beckenham Junction to Cannon Street (via Park's Bridge)	$\dot{I}$
Hayes to Charing Cross (via Lewisham)	$\overline{H}$
Hayes to Cannon Street (via Lewisham)	H
Hayes to Charing Cross (via Park's Bridge)	$\ddot{H}$
Hayes to Cannon Street (via Park's Bridge)	$\dot{H}$
Bromley North to Charing Cross.. ..	$\dot{O}$
Bromley North to Cannon Street ..	$\dot{O}$
Orpington or intermediate Stations to Charing Cross (via Chislehurst) ..	$\ddot{O}$
Orpington or intermediate Stations to Cannon Street (via Chislehurst) ..	O
Orpington or intermediate Stations to Victoria (via Herne Hill)	V
Orpington or intermediate Stations to Holborn (via Herne Hill)	H
Orpington or intermediate Stations to St. Paul's (via Herne Hill)	S
Orpington or intermediate Stations to Victoria (via Catford Loop)	$\overline{V}$
Orpington or intermediate Stations to Holborn (via Catford Loop)	$\overline{H}$
Orpington or intermediate Stations to St. Paul's (via Catford Loop) ..	$\overline{S}$
Dartford (or intermediate Stations to Charlton) to Charing Cross (via Greenwich)	$\overline{V}$
Dartford (or intermediate Stations to Charlton) to Cannon Street (via Greenwich)	V
Dartford (or intermediate Stations to Charlton) to Charing Cross (via North Kent (Charlton and Blackheath)) ..	$\overline{P}$
Dartford (or intermediate Stations to Charlton) to Cannon Street (via North Kent (Charlton and Blackheath)) ..	P
Dartford (or intermediate Stations to Kidbrooke) to Charing Cross (via Bexleyheath)	$\overline{S}$
Dartford (or intermediate Stations to Kidbrooke) to Cannon Street (via Bexleyheath)	S
Dartford (or intermediate Stations to Lee) to Charing Cross (via Loop Line)	$\overline{L}$
Dartford (or intermediate Stations to Lee) to Cannon Street (via Loop Line)	L
Crystal Palace to Victoria	$\ddot{V}$
Crystal Palace to Holborn	$\ddot{H}$
Crystal Palace to St. Paul's	$\ddot{S}$
Sutton to Holborn (via Wimbledon, Tulse Hill, and Herne Hill)	$\dot{H}$
Sutton to Victoria (via Wimbledon, Tulse Hill, and Herne Hill)	$\dot{I}$

When the electrification is extended to Gravesend it is anticipated that the codes will be:—

I—London and Gravesend *via* loop line.
P—London and Gravesend *via* Blackheath and Woolwich.
V—London and Gravesend *via* Greenwich and Woolwich.
S—London and Gravesend *via* Bexley Heath.

Trains from Gravesend will carry the present codes applying from Dartford to London.



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New 2-6-2 Tank Engine, L.M.S.R.

(A view of the first of these engines is given as frontispiece.)

By the courtesy of Sir Henry Fowler, K.B.E., Chief Mechanical Engineer of the London Midland & Scottish Railway, we are enabled to illustrate and describe herewith one of a new series of fifty 2-6-2 passenger tank engines, recently completed and sent into traffic.

They are being introduced to work suburban passenger trains, and, with this end in view, twenty engines to be allocated to the London district will be fitted with condensing gear, and also a special vacuum trip cock gear, to enable them to work over the Metropolitan lines. The engine illustrated, No. 15500, is, however, one of the first twenty, which are of the non-condensing type. They have been designed to give a tractive effort of 21,486 lb. at 85 per cent. of the boiler pressure, and will, it may be fully anticipated, prove a useful addition to the locomotive stock of the London Midland and Scottish Railway.

The whole of the engines will be fitted with automatic vacuum brake and carriage-warming apparatus. Twenty-two of them, which will be stationed at sheds where hot-water apparatus is provided for washing out, will be fitted with blow-off cocks for this purpose. Outside cylinders are provided, and the valve gear is of the Walschaert type. The crosshead is of the single-bar type. It will be noticed that sanding gear is applied to the leading coupled wheels and to both sides of the driving wheels; steam-operated brake gear is applied to all the coupled wheels, and also to the Bissel truck wheels, which have brake blocks on both sides.

A standard superheated boiler has been utilised having a grate area of 17.5 sq. ft. The working pressure is 200 lb. per sq. in. and an exhaust steam injector of the latest type has been fitted, on the right-hand side of the engine, *i.e.*, on the fireman's side. The standard type of Ross "pop" safety valves is provided.

Mechanical lubrication is fitted for the cylinders, piston valves and spindles, and piston rods, whilst a second mechanical lubricator supplies oil to the coupled axle-boxes. In addition, standard locomotive fittings have been provided, where possible, to facilitate interchangeability. Every attention has been given to the provision of a comfortable, roomy, and well-ventilated cab, and easy control of all fittings.

A "Dreadnought" combined large and small ejector is fitted, and the engine is piped to the front and hind ends with the vacuum train pipe, the application of the brake being controlled by the operation of the driver's brake valve in the usual manner.

The main particulars are as follow:—

Cylinders, dia.	17½ in.
,, piston stroke ..	26 in.
,, piston valve, dia.	8 in.
Wheels, coupled dia.	5 ft. 3 in.
,, leading and trailing ..	3 ft. 3½ in.
Wheelbase, coupled	16 ft. 6 in.
,, total	33 ft. 3 in.
Boiler heating surface—	
Tubes	692·75 sq. ft.
Firebox	103·5 sq. ft.
Total	796·25 sq. ft.
Superheater	172·75 sq. ft.
Combined total ..	969·0 sq. ft.

The engine in working order weighs 70 tons 10 cwt. 1 qr., and, as can be seen from the drawing, the percentage available for adhesion amounts to 44 tons 14 cwt. 1 qr. The water capacity is 1,500 gallons, and the coal capacity 3 tons. The engines present a very neat and well-proportioned appearance, and resemble in their main features of design the 2-6-4 tank engines built at Derby at the beginning of 1928, which are, however, of a heavier type.

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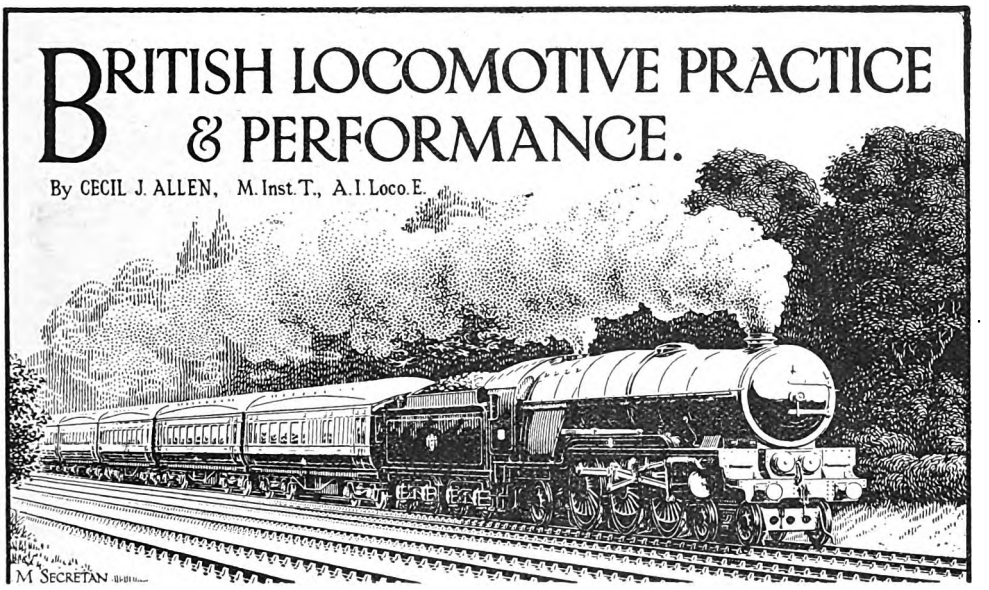
BRITISH LOCOMOTIVE PRACTICE & PERFORMANCE.

By CECIL J. ALLEN, M.Inst.T., A.I.Loco.E.



FOUR particularly interesting letters have reached me recently, setting out in striking contrast the respective views of the passenger in the train and the crew on the footplate. The passengers shall have the first say. Quoting a remark that I used in December last, to the effect that on a certain Great Western run the driver of *King Edward V* made but little attempt to recover lost time, his net time being, roughly, in accordance with the schedule, one correspondent says: "I believe you thus expressed what might be termed a fourth dimension influencing locomotive work. Load may be regarded as the first dimension, scheduled speed as the second, weather and other running conditions as the third and the driver as the fourth.

"For the past two years I have been a season-ticket holder between Acton and Reading. I have to travel by the 6.40 p.m. from Reading, which is due at Ealing at 7.17 p.m., and allows me nominally 7 min. in which to catch the Acton connection. The 6.40 p.m. is often 4 to 12 min. late on reaching Reading, and at other times is held in order that the 5.15 p.m. two-hour express from Bristol, when that also is running late, may precede her on the up main line. A small percentage of drivers will make up time after this late start, while the bulk of them will adhere strictly to schedule, so that I miss at Ealing the Acton connection. Yet this train immediately follows one running at an average speed of 70 miles an hour and upwards, and a clear road is practically certain. On successive days I have timed the 6.40 p.m., booked 37 min., to take 36 and 38½ min. from Reading to Ealing, the 8.35 p.m., nominally 3 min. faster, to take 38 and 34½ min., and the 9.40 p.m., also allowed 34 min., to take no more than 29 and 30 min. The effect of the missed Ealing connection in my case is that I could travel by road, from door to door, in less time, and were I to transfer to the road the railway would lose £44 annually on my ticket. Thus this fourth dimension of locomotive driving has a direct bearing on the attitude of the regular traveller to transport by rail. Is it a sound policy to permit slow schedules of this character on main lines, when rail space is at a premium, and to take so little interest—apparently—in the recovery of lost time by these secondary expresses, when much of the railway's custom may depend directly on strict timekeeping?"

The second letter refers to my articles of last August and September, and takes another viewpoint in regard to unpunctual running. "I was more than ordinarily interested," says the writer, "in your quotations from a friend on the subject

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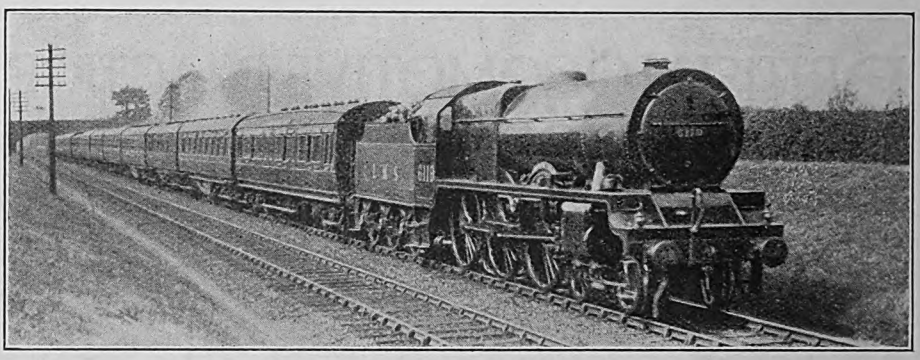
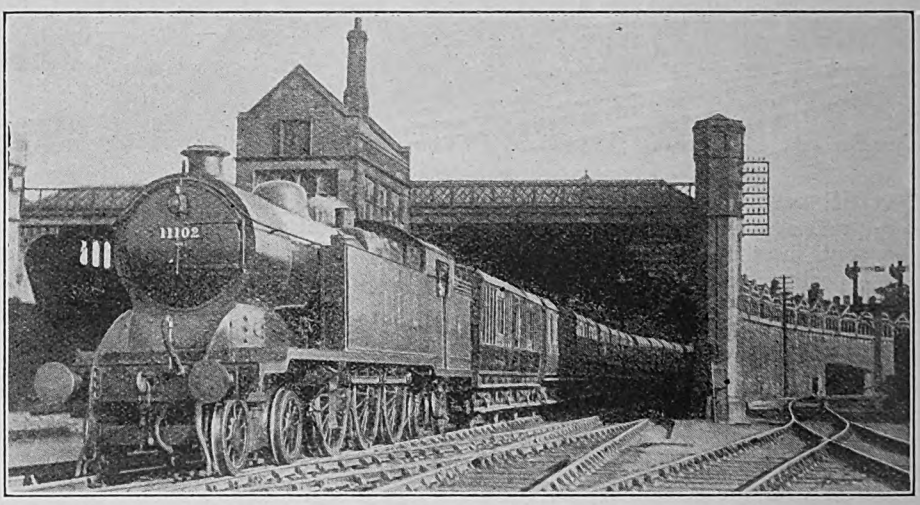
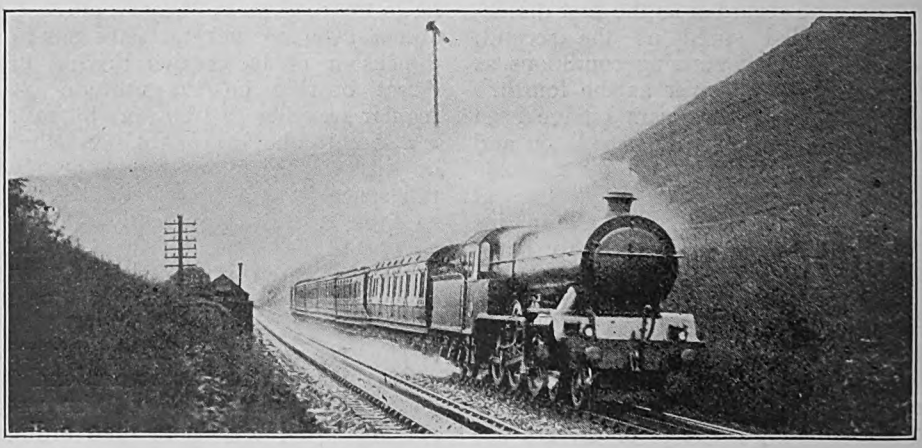


L.M.S.R. UP "LAKES EXPRESS" NEAR ELMSWORTH,
4-6-0 No. 6119 *Lancashire Fusilier.*



WHITEHAVEN TRAIN LEAVING CARNFORTH.
Furness 4-6-4T No. 11102.



LONDON-CARLISLE TRAIN ON TEBAY TROUGHS.
L. & Y. Rebuilt 4-6-0. *(Photographs by H. Gordon Tidey.)*

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of signal delays, and in the inference that 'control' is responsible for a large number of unpunctual arrivals. Years ago, before control working had begun to tie the hands of signalmen, a certain link of local drivers I knew well bore such a splendid reputation for smart working that when only a limited time was available in which to reach a certain point and get clear, these men were allowed to precede crack trains. The usual remark of the signalmen concerned was: 'It's ——, he'll get through all right. None of that link ever let us down.' Here was a case of co-operation between drivers and signalmen towards punctual and efficient working. In locomotive driving the psychology of the driver plays a very important part, and is a factor which at first sight would appear to be too lightly considered by the authorities in their selection of the most suitable men for the crack workings. But it may be that this lack of consideration is more apparent than real, for the ultimate effect on the mind of an enterprising driver of rigid train control—though it would be idle to attempt to deny the many advantages of this method of train working—is one of deterioration. To know that time recovered by good driving will be frittered away by the control staff, in their ignorance of the niceties of local conditions, is bound, in many cases, to have an adverse effect on punctuality." This letter is one with which I am in full agreement, but, obviously, it is only applicable to those sections of our main lines over which control working is applicable, and not always then. To these sources of delay might be added inadequate timetable margins in front of expresses.

The third letter, not so recent as the preceding two, concerns, as did the first, the fight between the railways and the roads. "In the discussions on this subject," says the writer, "there seems to me to be universal failure to get down to the real issue. Assuming that this competition is to continue, it becomes essential for the railways to exploit, and to bring prominently before the public, those advantages which are inherent in rail transport and lacking in road transport. Up till now they have failed conspicuously to do so. All that they have done is to claim that rail travel is safer, which is certainly the case. But it is not certain that road vehicles may not eventually equal those of the railway in comfort, and, in proportion to the fares charged, it is probable that many of them already do so, if not offering comfort superior to that of railway third class. The one real and practically unassailable advantage on the side of the railways—a veritable trump card—is that of speed. It seems utterly unaccountable that this fact should not be realised and acted on, but of all the measures undertaken to meet road competition, and especially the long-distance competition of the motor-coach and the private owner, the exploitation of speed seems to be the one remedy which is not even considered."

My correspondent then instances various glaring cases of time-table sloth in the booking of cross-country and secondary train services, which he expressly refrains from describing as "less important" than the crack trains. "To companies hard pressed for revenue every crumb is important, and it may well be that radical improvement of the less spectacular bookings would bring in a greater net gain than further acceleration of the showiest schedules. There are many indefensibly slow bookings of intermediate services," the writer continues, "which appear to exist because no one seems to think of altering them. The excuse for perpetuating such time-table abuses is removed by the provision of large modern express locomotives in increasing numbers, which releases the older engines, of still powerful types, for less exacting duties. While the railways had a monopoly, these considerations could be ignored, but at the present juncture I am confident that more could be done to regain passenger traffic by a thorough overhaul of these minor vexations than by the inauguration of further indefinitely long non-stop runs, more *trains-de-luxe* for the favoured few, and similar heroic measures. If the railways are to prevent further loss of traffic to the roads, they will have to concentrate on proving to the public that the railway service is much the quickest, and that everything in reason is being done to add to the passenger's sense of well-being."

So much for comment from the compartment; now for the views of the footplate. "Why all this craving for huge and powerful engines and long, unwieldy

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trains? As a practical railwayman," writes my fourth correspondent, " I contend that it is a mistaken policy. For a fireman to have to heave coal into these monsters when trailing enormous trains of 30-ton to 34-ton bogies about, with a few passengers in each, is a heart-breaking job. Our railways want to take a leaf out of the book of the buses, and run a more frequent service of lighter trains. On several occasions last summer I saw the non-stop ' Flying Scotsman ' with eleven or twelve bogies behind the tender, and the passengers it carried could have been accommodated comfortably in three or four coaches. It beats me why the ' Scotsman ' should at other times be made up to 15 or 16 cars, when it could be run in two portions of, say, 8 cars each. The first could be non-stop to Edinburgh, if you like, really fast and not ambling along like last year's non-stop, though I should think it would be better to stop outside York to change engines. Two hundred miles is plenty far enough without a stop for both engines and men. Then, after ' fettling ' the engine, and a breather, the engine and men could return to London, to avoid lodging away and to keep them to their own engine, which, as every locomotive-man will agree, is better than taking one over from the other fellow. I wish I had the opportunity of being in charge of one of the North Eastern ' R ' or ' R1 ' 4-4-0 class engines, well set up at the works ; I'll guarantee I could run from York to London and back, or York to Edinburgh and back, with seven or eight bogies on, and we would hardly know we had been at work.

" For my part I contend that the Great Northern ' Atlantics,' the Midland compounds and the Great Central ' Directors are plenty big enough for any express work with a reasonable train. The ' Pacifics ' are all right where they belong, in Yankee-land. There's no doubt that they can pull and run, but they pull too much. So long as the railways keep building this kind of monster, so much longer will the likes of me have to keep on coal-heaving. In fact, I have given up all hope of ever attaining a driver's position. The same thing applies to goods-train working. We get ' Mikado ' and big ' Mogul ' engines hauling their hundred-wagon trains, but from my point of view no freight train should consist of more than 45 or 50 wagons or so. The ' J.39 ' 0-6-0 of the L.N.E.R. is plenty big enough for any goods work, and ideal for heavy excursion work. Then, again, take the task of stabling and preparing these huge monsters ; you need a wheel-barrow to carry the oil required from the stores to the engine, not to mention other snags, such as water-columns which will not come over the back of the tender, turntables not long enough to turn them, and so on. No, sir, it's no good trying to copy this bigger-and-bigger Yankee idea. Let us have lighter, quicker, and more frequent trains, and never mind if the foreigners do call them ' toys.' So please do not laud the big machines to the skies in your splendid articles, but give the ' little 'uns '—the Midland compounds, the ' Directors,' the ' Georges,' and many others—their due meed of praise! "

There is not a reader, I am sure, who will not wish this correspondent a speedy realisation of his footplate aspirations. And there will be but few, also, to quarrel with other of his contentions. There is little doubt, as I pointed out last month, that the average British express, except in the case of week-end traffic, is overloaded with stock in proportion to its average complement of passengers, and that this is a matter which ought to receive most serious consideration with a view to effecting running economies. With my other correspondents, who view the matter from the passenger's point of view, this railwayman also sees salvation for the railways in higher speeds. But I cannot altogether agree with his other arguments. Duplication of trains, in order to reduce engine loads, would involve duplication of the cost of train-crews and increased line occupation and congestion, against which the only compensation in revenue would be such increased traffic as might be secured as a result of more frequent service. Nor would coal consumption be reduced, as the aim in the design of the modern mammoths is, by high working pressures and improved design of valve-motions, to bring coal consumption down. And I can testify, from a fairly extensive footplate experience on many of the largest locomotive types in the country, that this aim is being realised. No, I am afraid

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that in these articles I must continue to back the "big" engine. But at the same time far more careful efforts than hitherto might well be devoted to cutting rolling-stock per train down to something nearer actual average requirements, and then to exploiting to the full the power of the modern express locomotive in increased train-speeds, while at the same time giving definite encouragement to drivers towards strict timekeeping.

And now I propose to describe some runs which have a certain bearing on all four of the letters just reproduced. During the past few months I have seen more of the East Coast route than for some time previously, and particularly of its best train—the 5.30 p.m. out of King's Cross. These runs afford some striking evidence of the variation in driving method to which attention was called in the first letter; they incorporate some of the "control" delays to which the second writer adverted, as well as delays from inadequate time-table margins; they show that the modern engine, when driven to capacity, has time in hand even on the fastest schedule of the day, thus adding point to the third letter; and better evidence could hardly be adduced as to the capacity of the Gresley "Pacifics" to "pull and run," which was a remark quoted from the fourth letter. On the bulk of the journeys it was at Grantham that the enterprising feats of driving began. From King's Cross to Grantham, which is easily the hardest part of the schedule throughout to Newcastle, drivers were content, for the most part, to keep their net times, regaining no loss by signal checks; from York northwards, on the easiest of the bookings, running was so slack that it was difficult to believe that the same type of locomotive was at the head of the train.

Of the runs between King's Cross and Grantham I have tabulated only two. On the first *Isinglass* had the misfortune to be brought by signals to a dead stand at Langley, presumably by the 5.10 ahead, so jeopardising her chances of getting a proper supply of water from the track-troughs immediately following, not to mention losing over 5 min. of precious time. Before this, speeds had been 44 to 44½ m.p.h., sustained up the 1 in 200 to Potter's Bar, 76½ at Hatfield and 54 at Woolmer Green. The effect of this check was felt all the way onwards to St. Neots, speeds being 75 an hour at Three Counties, 71½ at Biggleswade, 70½ at Tempsford, 64½ at St. Neot's, 70½ at Offord and 52 at Leys Box; we were then doing 75 again before the Connington check, this time presumably from the 5 p.m. out of King's Cross. All the margins in front of the 5.30 are dreadfully tight, the 5.7 p.m. from Broad Street

L.N.E.R. KING'S CROSS—GRANTHAM.

Distance.	Engine, 4-6-2 No.	Schedule.	2562	4479
	,, Name ..		*Isinglass.*	*Robert the Devil.*
	Load, axles ..		44	52
	,, tons tare ..		356	428
	,, ,, full ..		375	460
Mls.		min.	m. s.	m. s.
0·0	KING'S CROSS	0	0 00	0 00
2·6	FINSBURY PK	—	6 25	6 45
5·0	Wood Green ..	—	9 30	10 05
9·2	New Barnet ..	—	14 50	15 30
12·7	Potter's Bar ..	—	19 35	20 30
17·7	HATFIELD ..	25	24 35	25 45
23·5	*Woolmer Green*	—	29 55	31 20
			sig. stop.	
28·6	Stevenage ..	—	38 50	36 25
31·9	HITCHIN ..	39	42 20	39 15
37·0	Arlesey	—	46 35	43 10
44·1	Sandy	—	52 40	48 50
51·7	St. Neot's ..	—	59 30	55 20
58·9	HUNTINGDON	63	65 50	61 40
62·0	*Leys*	—	69 05	64 45
			sigs.	
69·4	Holme	—	76 45	71 20
75·0	*Fletton Jc.* ..	—	82 45	76 40
76·4	PETERBORO'	81	84 40	78 35
79·5	*Werrington Jc.*	—	89 35	83 25
84·8	Tallington ..	—	95 10	89 25
88·6	Essendine ..	—	99 05	93 40
92·2	Little Bytham	—	102 55	97 45
97·1	Corby	—	108 55	104 05
100·1	*Stoke*	—	112 45	108 05
105·5	GRANTHAM ..	114	118 45	114 05
105·5	Net times (min.)	114	112	114

being due to clear by about 6 min. at Potter's Bar, the 5.10 from King's Cross by 5 min. at Hitchin Junction, the 5.0 by 6 min. at Peterborough, and the 4.15 by 9 min. at Grantham! I noted no speeds after Peterborough other than 46½ m.p.h. at Stoke; by the running after Holme the driver appeared discouraged, and we were 4¾ min. late in. But net time probably did not exceed 112 min.

A run by *Galtee More* with the same load gave times of 6¼ min. to Finsbury

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Park, 25½ min. to Hatfield, 40 min. 5 sec. to Hitchin, 50½ min. to Sandy, 64¼ min. to Huntingdon, 82¼ min. to Peterborough, 96 min. 40 sec. to Essendine, 110 min. 10 sec. to Stoke and 116 min. 35 sec. to Grantham—running not sufficiently hard for timekeeping by a margin of over 2½ min. No. 2560, *Pretty Polly,* again, with 375 tons, suffered a p.w. check at Hatfield and another near Holme, so taking 6 min. 10 sec. to Finsbury Park, 21 min. 5 sec. to Potter's Bar, 27 min. 40 sec. to Hatfield, 41¾ min. to Hitchin, 51¾ min. to Sandy, 64 min. 35 sec. to Huntingdon (22 min. 50 sec. from Hitchin to Huntingdon with no higher speed than 77½ m.p.h. at Three Counties and 76½ at Tempsford), and 67 min. 35 sec. to Leys Box, where our minimum rate was 58½ m.p.h., followed by 75 down Ripton bank. To Peterborough we took 82 min. 50 sec., but then came a very bad signal check—this time from the 4.15 down—at Greatford Box, and our time to Grantham was 117¾ min., or 3¾ min. overtime. Net time in this case was about 113 min.

The run submitted by a correspondent, and appearing in the second column, was considerably superior to these, in view of the 460-ton trainload, and especially in view of the remarkable time of 78 min. 5 sec. through Peterborough. Speeds noted by my correspondent were 51 m.p.h. before Wood Green, 43 at Potter's Bar, 68 at Hatfield, 55 at Woolmer Green, 79 at Three Counties, 63 at St. Neot's, 71 at Offord, 54 at Leys Box, 74 at Holme, 60 at Fletton Junction, the usual dead slowing through Peterborough, 55 at Tallington, 50½ at Bytham, an increase from 44½ to 51½ through Corby, 43 at Stoke, and 64 before slowing for Grantham station. But some of these speeds, as I have remarked before in the case of this particular recorder, appear to suffer from the rare fault of underestimation. For instance, the *average* speed of 78.5 m.p.h. from Hitchin to Arlesey is certain to have produced a higher maximum rate than 79 an hour. To keep time with this load was a very fine achievement, and specially noteworthy times achieved were 56 min. 10 sec. for the 62.3 miles from Potter's Bar to Fletton Junction, and 22 min. 25 sec. for the 27.0 miles from Hitchin to Huntingdon. Sharpe was the driver.

Before leaving the London to Grantham runs, I must mention one or two on other trains. The driver of No. 2545, *Diamond Jubilee,* with a train of ten 8-wheelers and a triplet restaurant car set, weighing 440 tons with a very full passenger complement, had an attack of real *joie de vivre* on one trip, passing Finsbury Park in 6 min. 20 sec., Potter's Bar in 21 min. 5 sec., Hatfield in 26 min. 25 sec., Hitchin in 39¾ min., Sandy in 49 min. 20 sec., Huntingdon in 62 min. 35 sec.—here the engine was eased—Leys Box in 66 min. 5 sec., Holme in 73 min. 10 sec., Peterborough in 80 min. 35 sec., Essendine in 96 min. 10 sec. and Stoke in 110¼ min. Grantham would have been reached in 116½ min., but for a signal check outside, which made the time 118 min. 50 sec.—and even this was 5¼ min. early! *Ormonde,* No. 2556, with the same train and the same load, passed Peterborough in 83 min. 35 sec. and reached Grantham in 120 min. 20 sec., 3¾ min. early, with no checks other than a diversion through one of the slow road platforms at Finsbury Park. On the "Flying Scotsman," No. 2746, *Fairway* (one of the super-"Pacifics"), after a very slow start with a 480-ton train, taking 43¾ min. to Hitchin, passed Peterborough in 84 min. 35 sec., and reached Grantham in precisely the booked time of 122 min.

We now come to the table of runs forward from Grantham to York. It will be seen that every one of them betters "even time" from Grantham to Bawtry, after which various signal checks were experienced, and this brilliant start over the second stage of the 5.30's journey appears to be a nightly event. *Isinglass* left Grantham 4¼ min. late. We were doing 75 m.p.h. at Hougham and 77½ before Newark, where, however, adverse signals brought us down to 50 an hour. But we accelerated rapidly over 6 miles of level to 69 at Carlton, topped Markham at 53½, touched 75 before Retford, easing slightly over the crossing, and then did some magnificent running onwards to Bawtry, reaching the unusual maximum of 76½ at Scrooby. Breasting Piper's Wood at 61, we attained 72½ an hour at Black Carr Junction, eased to 65 through Doncaster, and then attained 70½ by Shaftholme Junction, maintaining between that speed and 65 an hour all the

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way to Selby. From Barkstone to Templehirst we covered 60.1 miles in 54 min. 10 sec., or 53 min. net. Despite a signal check outside York, we converted our 4¼-min. late start to a 3-min. early arrival, doing the journey of 82.7 miles in 84¾ min., or 82½ min. net. This, added to the 112 min. net time of the same engine from London to Grantham, makes a total of 194½ min. net running time from London to York, or an equivalent net non-stop time of about 190½ or 191 min. for 188.2 miles.

On *Pretty Polly's* run we were 3½ min. late from Grantham, and this time, apart from a minute lost by signals outside York, we were unchecked. York was reached 1¾ min. early, and net time was 85¾ min., or 6¼ min. inside schedule. Speeds were 75 m.p.h. before Newark, 65 at Carlton, 51 at Markham, 74 before and 70½ after Retford, 72½ at Scrooby, 56½ at Piper's Wood, 72½ at Black Carr Junction, 61½ through Doncaster, and easier going from there onwards, with the usual slacks over Selby Bridge and Chaloner Whin Junction. The run behind *Prince Palatine* was the only one on which I joined the train at Grantham, and on this occasion some good travelling from King's Cross must have taken place, as the arrival at Grantham was a minute early. But we made a more brilliant start than ever, punctual though we were, passing Hougham at 75 m.p.h., Newark at 79, Carlton at 71½, Markham at 55½, Retford at 77½, and had breasted Piper's Wood at 55 when there came an all but dead stand for signals at Rossington. About the remainder of the run there were

L.N.E.R. GRANTHAM TO DONCASTER AND YORK.

Distance.	Engine, 4-6-2, No. ..	Schedule.	2562	2560	2551	2745	2747	4479
	,, Name ..		*Isinglass.*	*Pretty Polly.*	*Prince Palatine.*	*Diamond Jubilee.*	*Coronach.*	*Robert the Devil.*
	Load, axles		44	44	44	48	—	52
	,, tons tare ..		356	356	357	410	425	428
	,, ,, full ..		375	375	380	440	450	460
Mls.		min.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.
0·0	GRANTHAM ..	0	0 00	0 00	0 00	0 00	0 00	0 00
4·2	Barkstone	—	7 00	6 55	6 35	7 15	7 10	6 45
9·9	Claypole	—	11 40	11 40	11 05	11 55	11 45	11 15
			sigs.					
14·6	NEWARK	15	15 50	15 35	14 50	15 50	15 45	15 15
20·9	Carlton	—	21 45	21 05	20 05	20 55	21 00	20 35
26·4	Tuxford	—	27 10	26 45	25 15	26 10	26 25	26 00
28·2	*Markham Box* ..	—	29 05	28 50	27 05	28 05	28 20	28 00
33·1	RETFORD	34	33 35	33 35	31 30	32 40	32 55	32 40
38·4	Ranskill	—	38 10	38 05	36 05	37 20	37 40	37 30
42·2	Bawtry	—	41 20	41 25	39 25	40 45	41 00	41 05
44·0	*Piper's Wood* ..	—	43 00	43 15	41 15	42 30	42 35	43 05
					sigs.			
47·7	*Block Carr Junction*	—	46 15	46 40	48 00	46 10	45 45	46 45
						sigs.		
50·5	DONCASTER ..	52	48 45	49 10	50 55	50 10	†49 15	49 35
								sigs.
54·7	*Shaftholme Junction* ..	57	52 35	53 20	55 25	55 50	—	61 10
57·5	Moss	—	55 05	56 00	58 15	58 55	—	—
60·5	Balne	—	57 45	58 45	61 10	62 05	—	—
64·3	Templehirst	—	61 10	62 25	65 10	66 30	—	—
68·9	SELBY	74	66 05	67 15	69 40	71 40	—	77 15
73·0	Riccall	—	71 55	73 45	75 15	78 20	—	—
						sigs.		
75·6	Escrick	—	74 55	76 35	78 15	82 45	—	—
80·7	*Chaloner Whin Junc.*	—	80 20	82 10	84 00	89 00	—	91 50
			sigs.	sigs.				sigs.
82·7	YORK	92	84 45	86 40	87 45	*92 30	—	95 30
82·7	Net times (min.) ..	92	82½	85¾	83¾	*87½	†49¼	86½

* Schedule: 95 min. † Schedule 54 min.

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no exceptional features and we reached York 4¼ min. early. My continuation run with *Galtee More* is the only one not tabulated, as it was ruined by signal checks. But in different hands from Grantham she seemed a different engine, passing Retford in 15 min. 10 sec., at 77½ m.p.h., and Carlton in 20½ min., at a maintained speed of 70½ ; despite a p.w. check at Tuxford, we breasted Markham in 28 min. 20 sec., touched 75 an hour before Retford, and passed there in 33 min. 5 sec., check notwithstanding Ranskill was passed in 37 min. 50 sec., but signal checks from there onwards resulted in our being 13 min. late into York.

The next run tabulated is the continuation of *Diamond Jubilee's* fine trip on the 1.15 p.m. down, which, load considered, was equal in quality—as far as Doncaster—to any of the foregoing. We passed Hougham at 71½ m.p.h., touched 75, fell back to 72½ and then reached 77½ at Newark, maintained 72½ across the level of the Trent Valley to Carlton, went up to Markham at 54, attained 76½ before Retford and maintained 70½ through to Scrooby troughs, after which we fell to 54 at Piper's Wood. Apart from a severe signal check outside Doncaster, we should have been through there in 48¾ min., though allowed 56 min. Easier running now became the order of the day, but even so, and despite another signal check, York was reached in 92½ min., 2½ min. early. Net gain on schedule was 7½ min.

Coronach's run was on the 10.10 a.m. from King's Cross, allowed 54 min. to Doncaster, start-to-stop, for the 50.5 miles. By reason of a late start, this allowance was cut to 49¼ min.—a gain of 4¾ min. Speeds were 79 m.p.h. before Newark, 69 at Claypole, 55 at Markham, 69 before Retford (eased to 62 through the station), 74 at Scrooby, and the notable minimum of 66 at Piper's Wood. With a 450-ton train this was a very smart run. Last of all comes the fine continuation, from Grantham to York, of *Robert the Devil's* 460-ton effort on the 5.30, Driver King, of Grantham, being now in charge. Unhappily, my correspondent's speeds are again below the probable figures ; he gives speeds varying from 67 to 74 m.p.h. between Barkstone and Claypole, whereas the *average* here works out at 75.3 m.p.h. It is evident that his methods of speed estimation require overhaul. But the speeds can be deduced with fair accuracy from those of the other tabulated journeys. Bad signal checks beyond Doncaster ruined the finish of the run, but with a total of 9 min. of delays—including a dead stand at Arksey—the arrival at York was only 3½ min. late. All honour to Grantham Shed, which was responsible for all these runs north of Grantham, and which is still determined, as is abundantly clear from this table, to maintain its old-time reputation as one of the best time-keeping sheds of the erstwhile Great Northern system.

And now, having passed on to North Eastern area metals at Shaftholme Junction, we pass into the hands of their drivers at York. While 3 min. has been deducted from the pre-war timing of this train from King's Cross to Grantham, and 2 min. from the Grantham-York time, the one-time 44-min. and immediately pre-war 45-min. allowance for the level 44.1 miles from York to Darlington has now been eased out to 49 min. Yet when No. 2581, *Neil Gow,* replaced *Isinglass* at York, we took 9¾ min. to cover the first 5.5 miles to Beningbrough, 15 min. 35 sec. to Alne, 11.2 miles, 20 min. 20 sec. to Pilmoor, 16.1 miles, 25 min. 55 sec. to Thirsk, 22.1 miles—where we were doing 67 m.p.h.—and 32 min. 35 sec. to a dead stop for signals at Longlands Junction, 29.1 miles. Although we only stood here for 20 sec., the driver actually took 22 min. 20 sec. to run the remaining 15.0 miles to Darlington, unchecked, and we arrived 6¼ min. late. *Pretty Polly,* on the second run, was exchanged for *Robert the Devil,* No. 2579, but, on the score of relevance to their respective performances, their names might well have been exchanged also. No. 2579 had no checks, but dropped 80 sec. on schedule to Darlington, taking 9 min. to Beningbrough, 15 min. to Alne, 26½ min. to Thirsk, 34½ min. to Northallerton, 43 min. 35 sec. to Eryholme, and 50 min. 20 sec. to Darlington. We barely reached 60 m.p.h. at any point, and the poverty of the performance is the more noticeable by contrast with what the same engine did between King's Cross and York, as previously recorded. The substitute for *Prince Palatine* was *Dick Turpin,* but the

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latter's rides from York are evidently not on a par with his famous ride to York, as one moderate p.w. check at Tollerton caused us to lose 3 min. to Darlington, of which the check did not account for more than 2 min. Times were 9 min. 55 sec. to Beningbrough—an indefensibly sluggish start over 5.5 miles of level track —17 min. 20 sec. to Alne, 29½ min. to Thirsk, 37 min. to Northallerton, 45 min. 25 sec. to Eryholme and 52 min. to Darlington. Speeds were 64½ m.p.h. at Thirsk, 62½ at Northallerton, 68 beyond Danby (the only bright spot on the journey), and 61½ at Eryholme, the 22½ min. from Thirsk to Darlington being certainly some improvement on the desperately poor start. The only really good run was the continuation of my friend's 460-ton journey, No. 2578, *Bayardo*, a super-"Pacific," coming on in place of *Robert the Devil*. Driver Young was in charge, and he made a fine effort, passing Beningbrough in 8 min. 55 sec., Alne in 14 min. 25 sec., Pilmoor in 19¼ min., Thirsk in 24 min. 55 sec., Northallerton in 32 min. 10 sec., Eryholme in 40 min. 35 sec., and reaching Darlington in 46 min. 10 sec., or nearly 3 min. under schedule time. One further experience was on the 1.15 p.m. out of King's Cross, when *Isinglass*, with 440 tons, had taken 122 min. 20 sec. to Grantham (1¾ min. under schedule, despite 2 min. loss by a p.w. check), and 90½ min. from there to York (4½ min. gain). There one of the Raven "Pacifics" came on, and one p.w. check—at Tollerton—costing 2 min., sufficed to cause a loss of 3½ min. on the easy schedule of 52 min. to Darlington.

L.N.E.R. DARLINGTON—YORK.

Engine: super 4-6-2, No. 2750, *Papyrus*.
Load: 388 tons tare, 410 tons full.

Distance.		Schedule.	Actual.	Speeds.
Mls.		min.	m. s.	m.p.h.
0·0	DARLINGTON	0	0 00	—
2·6	Croft Spa ..	—	4 45	—
5·2	*Eryholme* ..	7	7 40	54
6·9	Cowton	—	9 25	—
10·4	Danby Wiske ..	—	12 35	65
14·1	NORTHALLERTON	16	16 10	60
17·5	Otterington ..	—	19 20	67
21·9	THIRSK ..	24	23 05	71½
26·1	Sessay	—	26 45	—
28·0	Pilmoor ..	—	28 35	69
30·7	Raskelf	—	30 55	—
32·9	Alne	35	32 45	71½
34·4	Tollerton ..	—	34 00	—
38·6	Beningbrough	—	37 45	—
42·5	*Poppleton Jc.* ..	—	41 35	—
44·1	YORK ..	48	45 00	—

From my recent experiences, the effort of *Bayardo* is rare indeed nowadays on North Eastern metals. To mention a few other recent journeys, "Pacific" No. 2577, *Night Hawk*, leaving Darlington 7 min. late on the up afternoon "Scotsman," with only 335 tons, regained but one minute on the 49-min. booking to York, at no point exceeding 66 m.p.h., and passing Thirsk at only 65 m.p.h. *Robert the Devil*, on the 8 a.m. from Newcastle, with 405 tons, took 46 min. 40 sec. from Darlington to a stop at Clifton Junction, York, and apart from this would barely have kept time, in this case 48 min. to York; even the "Z" class "Atlantics" put up far more enterprising performances than these with equal loads in days gone by. No. 2400, *City of Newcastle*, of the Raven "Pacific" type, did rather better on the up afternoon "Scotsman" with 370 tons, passing Eryholme, 5.1 miles, in 7 min. 55 sec., at 52½ m.p.h., Danby Wiske in 13 min. 5 sec., at 66, Northallerton in 16 min. 50 sec., at 64, Thirsk in 23 min. 50 sec., at 70½, and Pilmoor in 29 min. 20 sec., at 64 an hour, the engine being now eased. But the operations of "control," with a freight train ahead, caused us to be brought to a dead stand at Tollerton, the 34.4 miles to this point having taken 36 min. 5 sec., start-to-stop. After standing 80 sec., we completed the remaining 9.7 miles to York in 14 min. 35 sec., and having started 4 min. late, arrived 7 min. late. Yet another run, with *Sir Hugo* and 440 tons on the "Flying Scotsman," started fairly well, Northallerton being passed in 17¼ min. and Thirsk, at 68 m.p.h., in 24 min. 20 sec., but we were brought to a dead stand by signals at Bishophouse Junction, having taken 31¾ min., start-to-stop, for the 29.3 miles. Again the driver gave up all effort, taking over 7 miles of level or very slightly falling track to re-attain the mile-a-minute rate, and requiring 19 min.

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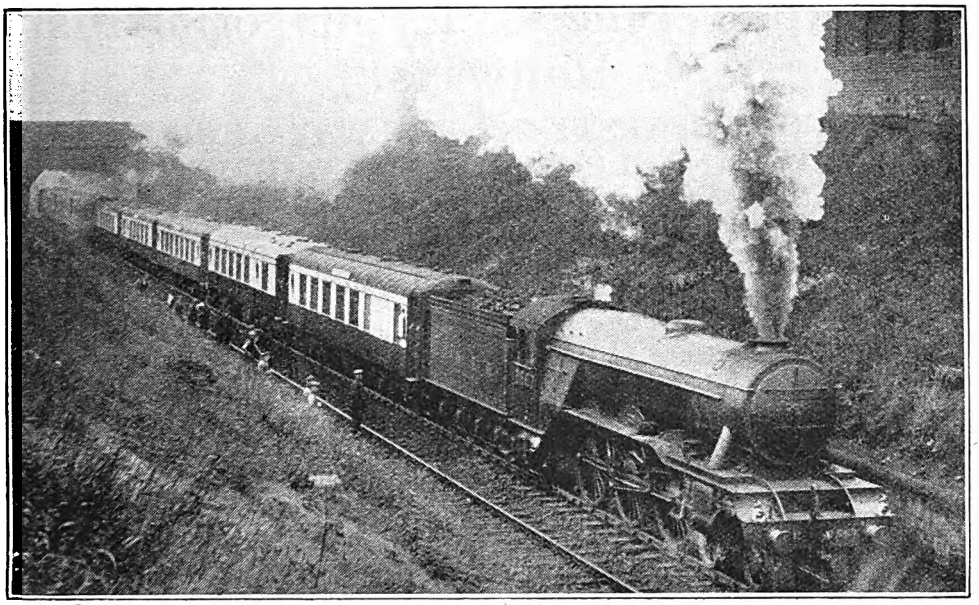

By courtesy of] [*"The L.N.E.R. Magazine"*

UP "QUEEN OF SCOTS" PULLMAN ASCENDING COWLAIRS INCLINE.

Engine—Pacific 2567 *Sir Nisto.*

40 sec. for the 14.8 miles, start-to-stop, from Bishophouse to York. Our total time on this run was 52 min. 5 sec., and having left 4 min. late, we arrived 8 min. late.

During the last six months I have had but one really good run from Darlington to York. It was on the up "Flying Scotsman," the super-"Pacific" engine, No. 2750, *Papyrus,* having to haul a 410-ton train, and the results were good enough to reproduce in tabular form. We did the 44.1 miles in exactly 45 min., with the usual slow approach to York, thus just making up our 3 min. late start. The 37.3 miles from Eryholme to Poppleton Junction were covered in 33 min. 55 sec., and the 21.1 miles from Ottering-ton to Beningbrough in 18 min. 25 sec. But the engine was in the hands of a Southern Area crew, working through from Newcastle to King's Cross. Comment is superfluous. I have also had several runs north of Newcastle, mostly of indifferent quality and showing loss of time. The only bright spot has been one quite brilliant effort behind the "Z" class "Atlantic," No. 2193, whose driver, as is confirmed by letters from a correspondent enclosing other specimens of his prowess, is of an altogether keener order. This was on the 1.15 p.m. from Edinburgh to Newcastle, when all three conditional stops were made, as well as a couple of p.w. slacks, but time was gained. As I have already badly overstepped my space, however, I must reserve the description of this run, and those forwarded by the correspondent last mentioned, until a later date.

Correspondence has to be acknowledged from Messrs. H. J. J Griffith (a further remarkable run on the 5.30 p.m. down, which arrived just too late for inclusion in the foregoing), R. A. H. Weight, C. E. W. Neat, C. E. T. Jones, A. J. Baker, J. T. Auld, C. M. Furst, T. C. Adkins, O. S. Nock, R. H. Dale, R. J. Dallas, G. A. Harris, Rev. A. G. Brown, R. E. C., A. H. H. and "Stirling 4-4-0," to all of whom my thanks are due.

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The Main Line Gradients of British Railways.

XVIII.—GREAT WESTERN RAILWAY—BIRKENHEAD, WORCESTER AND BIRMINGHAM TO BRISTOL MAIN LINES.

By "VOYAGEUR."

PADDINGTON TO BIRMINGHAM, SHREWSBURY, CHESTER AND BIRKENHEAD (Sheets 9, 10 and 13).

SINCE the opening in 1910 of the High Wycombe and Bicester cut-off throughout its length, including the lengthy section between Northolt and Ashendon Junctions constructed and opened jointly in 1906 by the Great Western and late Great Central Railways, the G.W.R. has enjoyed the use of a route to the North independent entirely of the West of England main line, save for the initial 3 miles out of Paddington to Old Oak Common West Junction. Prior to that date North trains used the Bristol main line for its first 53 miles, to Didcot, and the handicap of a much longer route—129¼ as against 113 miles to Birmingham, for example—prevented competition on level terms from London to the Black Country with the then London and North Western Railway. But now all that is changed, and Snow Hill Station at Birmingham, 2½ miles nearer to Paddington than is New Street to Euston, can be and is reached in the same two-hour timing.

Even with the advantage of 2½ miles in distance, however, it is doubtful if the Great Western is able to compete on strictly level terms. The Great Western handicap lies in the exceptional severity of the gradients—in proportion, that is, to the extraordinary speeds run over them, not to mention the number of service slacks, three of them severe, and most of them at points where high rates of speed would normally rule. Only the remarkable capacity of the modern Great Western locomotive could make such timings possible, and it is not too much to say that the finest all-round express locomotive work on the Great Western system is seen throughout the year between Paddington and Birmingham. Of no other express train service in the world could it be said, as it can of these Birmingham trains, that timekeeping is practically impossible apart from the attainment of speeds in excess of eighty miles an hour over favourable stretches of the route.

The first service slack comes no further than 3¼ miles out of Paddington, at Old Oak Common West Junction, but now that the Birmingham trains take the "Relief" lines to this point, and the junction has been relaid with movable diamond crossings, the speed limit has been raised to 40 m.p.h. From here onwards there is but little respite in the climbing for some 30 miles, until the crest of the Chilterns is reached beyond Saunderton. The ascent is divided into three stages, progressively steepening. First come 2 miles at 1 in 264 past Greenford, with a level 4½ miles on to South Harefield; then 7 miles at between 1 in 175 and 254, culminating just before Beaconsfield, with a descent of 3¼ miles on modest grades to and 2¾ level miles in the Wycombe Valley (the value of which is largely nullified by the Wycombe slack, for a full mile to 35 m.p.h., and coming undoubtedly within the "severe" category); and lastly, the 6 miles up to Saunderton Summit, mostly at 1 in 164 and 179.

Just as the Beaconsfield to Park Royal length constitutes one of the two finest racing stretches of the journey for up expresses, so down trains, given a splendid start by the 1¼ miles at 1 in 100-87 into Princes Risborough, have 11 miles of high-speed travelling from Saunderton Summit to Ashendon Junction, where in both directions of running it is customary to moderate the speed to between 60 and 50 m.p.h. The stiff ascent of the Chilterns on the north side

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is moderated for up trains by a separate location for 2 miles from Princes Risborough, flattened to 1 in 167. Between Ashendon and Aynho Junctions the Bicester cut-off has a gradient ruling at 1 in 200, the longest stretch of which is 5½ miles past Bicester to Ardley (another "galloping ground" for up expresses), followed by 4 miles down through and beyond Ardley to Aynho. Down the latter, however, speed seldom exceeds 70 m.p.h., and it is customary to ease to about 60 over the Aynho flying junction. Here the original Birmingham route is joined.

After a level stretch of 5 miles to Banbury, the line now rises gently to some high ground near Fenny Compton, and then, from 75 miles, there follows the second racing stretch for down expresses, extending right to Leamington. This bank provides some hard "collar-work" for the engines of up two-hour trains, especially the steepest section of it, for 3 miles at an average of 1 in 187 past Fosse Road. The worst bank on the route is, however, immediately beyond Leamington. There is a sharp downward dip out of Leamington, affording a smart start to down expresses (all but one of which, the 9.10 a.m. out of Paddington, now call there), but the 6-mile ascent to Hatton is, for so high-speed a route, tremendously steep. For over 3½ miles of its length it has an average inclination of 1 in 108. Down this incline some extremely high speeds are run in the opposite direction, as is, indeed, necessary, with a standard start-to-stop timing of only 25 min. for the 23.3 miles from Birmingham to Leamington. From Lapworth troughs there is a modest rise of 4¼ miles, after which the line is practically level into Snow Hill. Consideration of the profile will show that a timing of 26 min. from Leamington to Birmingham is considerably harder than one of 25 min. in the opposite direction.

Excellent starts are obtainable in both directions from Snow Hill Station, inclined at 1 in 45 to the south and 1 in 47 to the north, though both very short. Between Soho and Wednesbury there is some stiff climbing, on grades between 1 in 95 and 100, to the summit near West Bromwich, but timings between Birmingham and Wolverhampton are liberal, in view of these gradients and the regular service slacks, not to mention temporary slacks imposed from time to time in consequence of colliery pitfall subsidences.

North of Wolverhampton the gradients both steepen and lengthen considerably. Fast bookings have been tried over this section at various times—of which perhaps the most notable was the 95-min. non-stop allowance in 1923 of the first portion of the then 10.40 a.m. from Paddington, over the 84.6 miles from Birmingham to Chester—but have seldom lasted for long, and no high speeds are now scheduled. The chief physical features of the route north of Wolverhampton are the sharp and broken descent to Cosford, including 4½ miles at 1 in 87-137 ; the 4¾ miles at 1 in 150 up past Shifnal to Hollinswood ; the practically unbroken descent of nearly 10 miles to the Severn Valley, for nearly 3 miles at 1 in 120-132 ; the 4½-mile ascent out of Shrewsbury, beginning with 1½ miles at 100 ; the broken 9-mile climb to Preesgweene, and the 2½-mile drop thence at 143 to Whitehurst ; 1½ miles at 1 in 83 up from the Dee Viaduct at Cefn ; and, last, the terrific descent for 3¾ miles at 1 in 82½ from the Wheatsheaf Junction at Wrexham to Rossett. In the neighbourhood of Ruabon and Wrexham colliery workings are again responsible for both permanent and temporary speed restriction. A reversal of the Great Western trains takes place in Chester General Station, but special trains can avoid the station by proceeding direct northwards from Chester No. 6 Junction, known at one time as "Chester Cutting." From Chester to Birkenhead the line is jointly owned with the L.M.S., and the profile appears on Sheet 13.

DISTANCES.

Mile-posts, up side throughout to Chester, Paddington (zero) to Northolt Junction ; Northolt Junction (zero) to Ashendon Junction ; Ashendon Junction (zero) to Aynho Junction ; Aynho Junction (from zero at Paddington via Oxford) to Saltney Junction, Chester (except Wellington to Shrewsbury (zero) down side) ; Chester (zero) to Birkenhead, down side.

	Miles.	Miles.
PADDINGTON	0.0	0.0
Westbourne Park	1.3	1.3
Old Oak Common West Jc. (down)	3.3	3.3
Old Oak Lane Halt	..	3.6
North Acton	..	3.8

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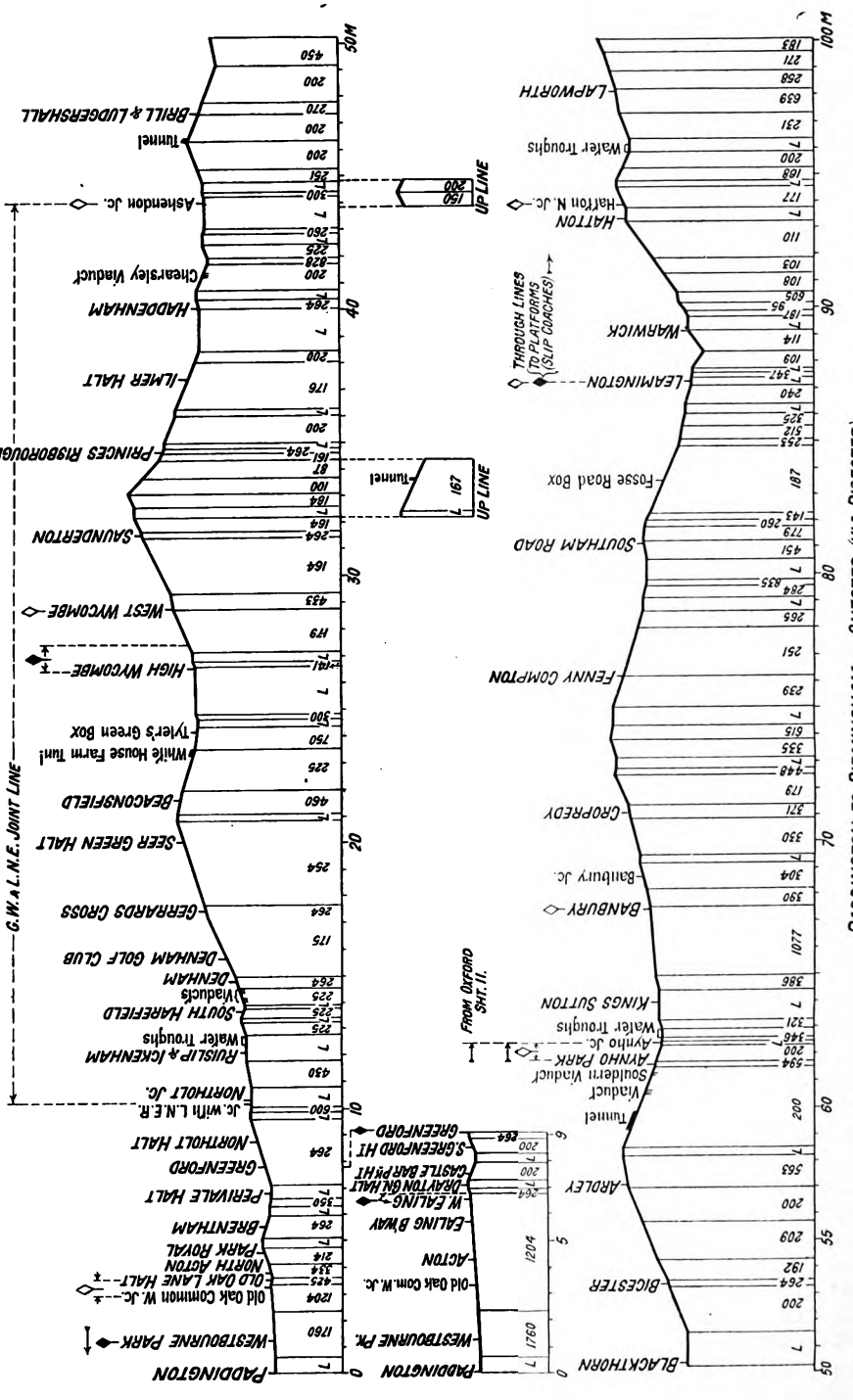

PADDINGTON TO BIRMINGHAM & CHESTER (VIA BICESTER)

SHEET 9.—GRADIENT PROFILES, GREAT WESTERN RAILWAY.

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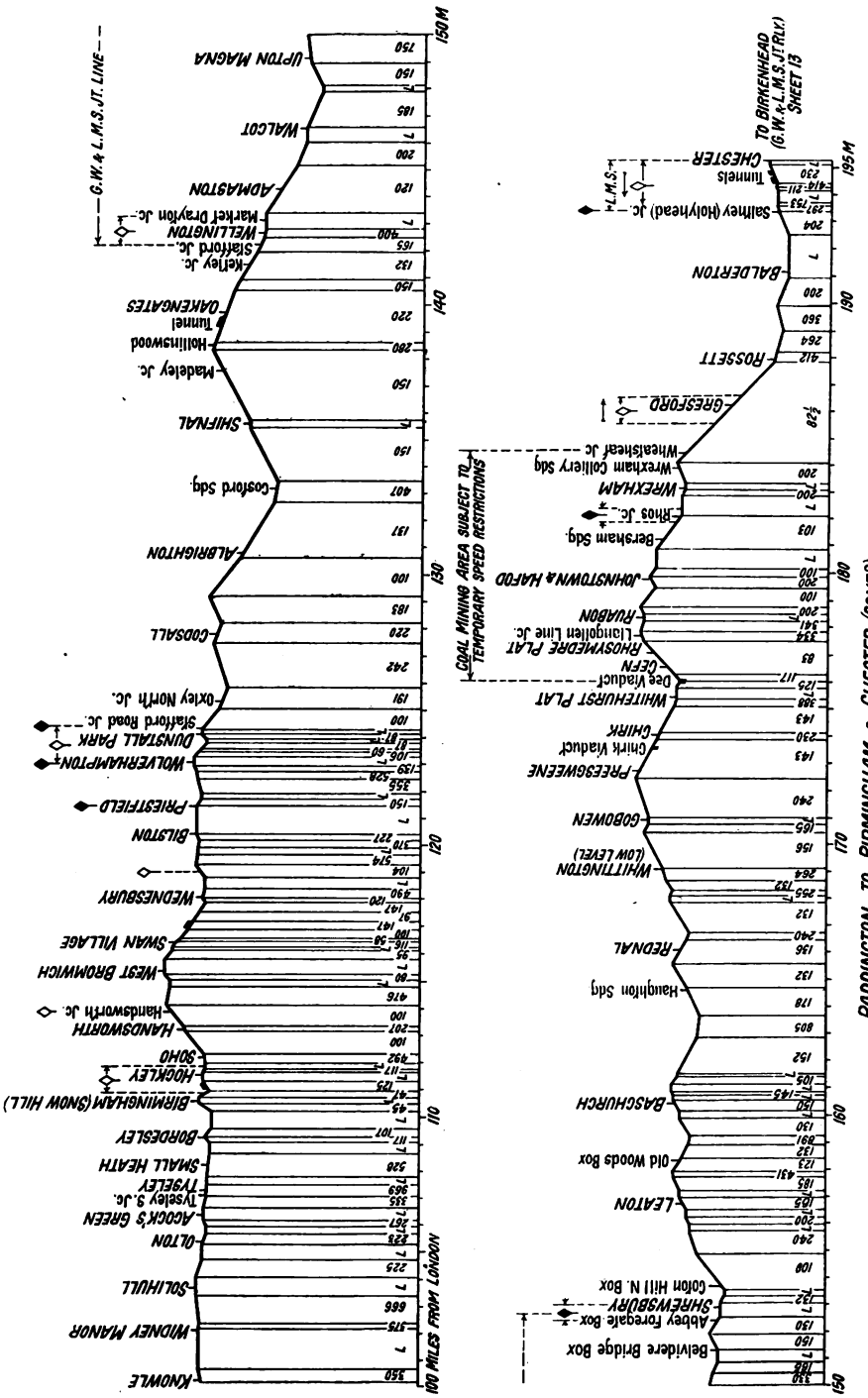

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	Miles.	Miles.
Park Royal		4.6
Brentham Platform		5 5
Perivale Platform		6.8
Acton	4.3	
EALING BROADWAY ..	5.7	
West Ealing	6.5	
Drayton Green Halt	7.1	
Castle Bar Park Halt ..	7.6	
South Greenford Halt ..	8.3	
Greenford	9.1	7.8
Northolt		8·8
NORTHOLT JUNCTION		10·3
Ruislip and Ickenham		12·1
South Harefield		13·8
Denham		14·8
Denham Golf Club Platform		15·7
Gerrard's Cross		17·4
Seer Green Halt		20·1
Beaconsfield		21·7
Tyler's Green (up)		24·2
HIGH WYCOMBE		26·6
West Wycombe		28·8
Saunderton		31·5
PRINCES RISBOROUGH		34·7
Ilmer Halt		37·4
Haddenham		40·1
*Ashendon Junction (up)**		44·1
Brill and Ludgershall		47·4
Blackthorn		50·4
BICESTER		53·4
Ardley		57·2
Aynho Park Platform		61·5
Aynho Junction (down)†		62·4
King's Sutton		63·9
BANBURY		67·4
Banbury Junction (down)		68·6
Cropredy		71·1
Claydon Crossing (down)		73·6
Fenny Compton		76·3
Knightcote (down)		78·4
Southam Road		81·2
Fosse Road (down)		83·6
LEAMINGTON SPA		87·3
WARWICK		89·3
Budbrook Crossing (up)		91·3
Hatton		93·9
Rowington Junction (down)		96·1
Lapworth		97·7
Knowle and Dorridge		100·2
Widney Manor		102·1
Solihull		103·6
Olton		105·4
Acock's Green and South Yardley ..		106·4
TYSELEY		107·3
Small Heath		108·3
	Miles.	
Bordesley	109·3	109·3
BIRMINGHAM (MOOR ST.) ..	110·1	
BIRMINGHAM (SNOW HILL) ..		110·6
Hockley		111·5
Soho and Winson Green		112·2
Handsworth		113·2
Handsworth Junction (up)		113·8
West Bromwich		115·3
Swan Village		116·4
WEDNESBURY		118·0
Bilston		120·4
Priestfield		121·5
WOLVERHAMPTON		123·0
Dunstall Park		124·1

	Miles.	Miles.
Oxley North Junction (up)		125 [illegible]
Codsall		12[illegible]
Albrighton		130·8
Cosford Siding		13[illegible]
Shifnal		13[illegible]
Madeley Junction (up)		13[illegible]
Hollinswood (down)		138·4
Oakengates		139·[illegible]
Ketley Junction (up)		14[illegible]
WELLINGTON..		14[illegible]
Admaston		144·[illegible]
Walcot		146
Upton Magna		149
Abbey Foregate (down)		15[illegible]
SHREWSBURY		15[illegible]·9
Coton Hill North (down)		153·7
Leaton		156·6
Old Woods (up)		158·3
Baschurch		160·4
Haughton Siding (down)		164·6
Rednal and West Felton		166·1
Whittington (Low Level)		169·1
GOBOWEN		170·9
Preesgweene		172·7
Chirk		173·9
Whitehurst Platform		175·4
Cefn		176·5
Rhosymede Halt		177·0
Llangollen Line Junction (down) ..		177·6
RUABON		178·3
Johnstown and Hafod		179·8
Rhos Junction (down)		182·0
WREXHAM		183·1
Wheatsheaf Junction (up)		184·5
Gresford		186·3
Rossett		187·9
Balderton		191·2
Saltney		193·0
Saltney Junction (up)		193·4
	Miles.	
Chester No. 6	194·8	194·8
(over up lines)	195·2	Direct.
CHESTER	0·0	
Mollington	2·9	197·5
Capenhurst	5·1	199·7
Ledsham	6·9	201·5
HOOTON	8·1	202·7
Bromborough	9·8	204·4
Spital	11·2	205·8
Port Sunlight	11·6	206·2
Bebington	12·4	207·0
ROCK FERRY..	13·5	208·1
BIRKENHEAD (TOWN) ..	14·7	209·3
BIRKENHEAD (WOODSIDE)	15·2	209·8

* Down side of up line.
† Up side of down line.

DIDCOT TO OXFORD AND WORCESTER AND OXFORD TO AYNHO JUNCTION. (Sheet 11.)

Little need be written about these two profiles. From Didcot throughout to Worcester there is only one bank worth mention, and that is the steep descent northwards from the 93rd mile-post. After 2½ miles down at 1 in 110-151 to

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Blockley, it is interrupted by a short rise to Campden, but from the 97¼ mile-post, just beyond Campden, it is continuous for 4¾ miles at 1 in 100 to Honeybourne, and another ¾-mile at 1 in 126 beyond. This carries the line off the eastern spurs of the Cotswold Hills into the Vale of Evesham. From Wolvercot Junction the line is almost unbrokenly rising for 26½ miles, though on very gentle grades, and there are some very smart express train runings in the reverse direction, from both Moreton and Kingham to Oxford. The spur between Wolvercot and Aynho Junctions—the original main line from Paddington to the North—has no grades worth mention. The mile-posts are carried through Didcot station, but all the tabulated distances are by the spur line from Didcot East to Didcot North Junction, which saves 10 chains. Distances are given not only from Paddington to Oxford, but also from Basingstoke and from Swindon, to enable readers to follow the course of such trains as the through Bournemouth-Birkenhead and Penzance-Aberdeen expresses.

DISTANCES.

Mile-posts, up side, Paddington (zero) to Worcester and Banbury via Didcot Station (0·1-mile further than via loop Didcot East Jc. to Didcot North Jc.)

			Miles.
PADDINGTON			0·0
READING			36·0
		Miles.	
BASINGSTOKE		0·0	
Reading West..		14·6	
Reading West Jc. (down) ..		15·2	37·0
Tilehurst		16·8	38·6
Pangbourne		19·7	41·5
Goring and Streatley		22·9	44·7
Cholsey and Moulsford ..		26·7	48·5
Didcot East Jc. (up)		31·0	52·8
	Miles.		
SWINDON ..	0·0		
Foxhall Jc. (up) ..	23·6		
*Didcot North Jc. (down)**	24·3	32·0	53·8
Culham	26·6	34·3	56·1
Radley	28·8	36·5	58·3
Kennington Jc. (up) ..	31·5	39·2	61·0
OXFORD	33·9	41·6	63·4
Wolvercot Platform		43·9	65·7
Wolvercot Jc. (down)		44·5	66·3
Kidlington		47·2	
Bletchington		49·3	
Heyford		53·4	
Fritwell and Somerton ..		56·3	
Aynho		58·5	
Aynho Jc. (down)		59·3	
King's Sutton		60·8	
BANBURY		64·3	

* Up side of line from Swindon.

	Miles.
Yarnton	67·2
Handborough	70·4
Charlbury	76·6
Ascott-under-Wychwood	80·3
Shipton	81·6
KINGHAM	84·6
Adlestrop	87·3
MORETON-IN-MARSH	91·7
Blockley	94·8
Campden	96·8
Honeybourne Jc. South	100·6
Honeybourne	101·7
Littleton	104·3
EVESHAM	106·6
Fladbury	109·7
PERSHORE	112·5
Stoulton	114·7
Norton Jc.	117·2
WORCESTER (SHRUB HILL) ..	120·4

BIRMINGHAM TO BRISTOL.

(Sheet 12.)

This was one of the last to be opened of the "cut-off" routes by which the Great Western management, in the early years of the present century, sought to curtail the distances of their original main lines. Prior to its opening, trains from Birmingham to Bristol had to proceed southwards almost to Didcot, and then by the east curve to Foxhall Junction, where the West of England main line was joined. The shortened route was formed, first by making a new line from Tyseley, 3 miles south of Birmingham, to Bearley, whence existing metals were used through Stratford-on-Avon to the junctions at Honeybourne; then another new line along the northern slopes of the Cotswolds to Cheltenham, to join the existing joint line of the G.W. and L.M.S. Companies from Lansdown Junction to Gloucester; from here, after pursuing the original South Wales main line, in an up direction, until the point of its divergence with the Midland West of England main line near Stonehouse, a junction with the latter was made at Standish, and running powers were obtained over the rival metals as far as Yate, a distance of all but 20 miles. From Yate short spurs were constructed to bring the Great Western trains up to the present South Wales main line at Westerleigh, and by means of the latter as far as Stoke Gifford, and the Severn Tunnel to Bristol line beyond Filton, Temple Meads Station is reached in a journey of 98¾ miles from Snow Hill.

The first severe slack comes at Tyseley, after which there is a modest rise to Earls-

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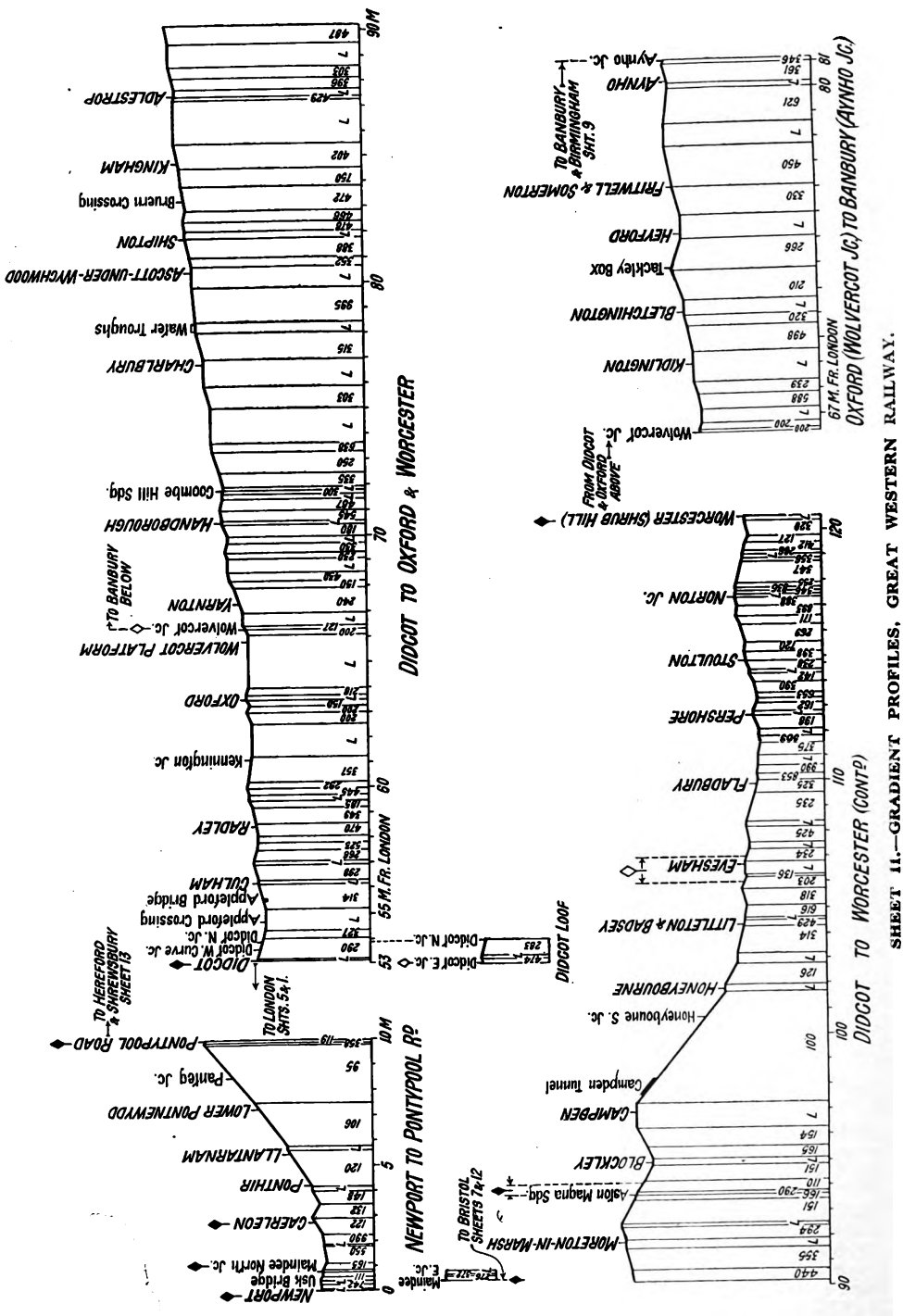

SHEET 11.—GRADIENT PROFILES, GREAT WESTERN RAILWAY.

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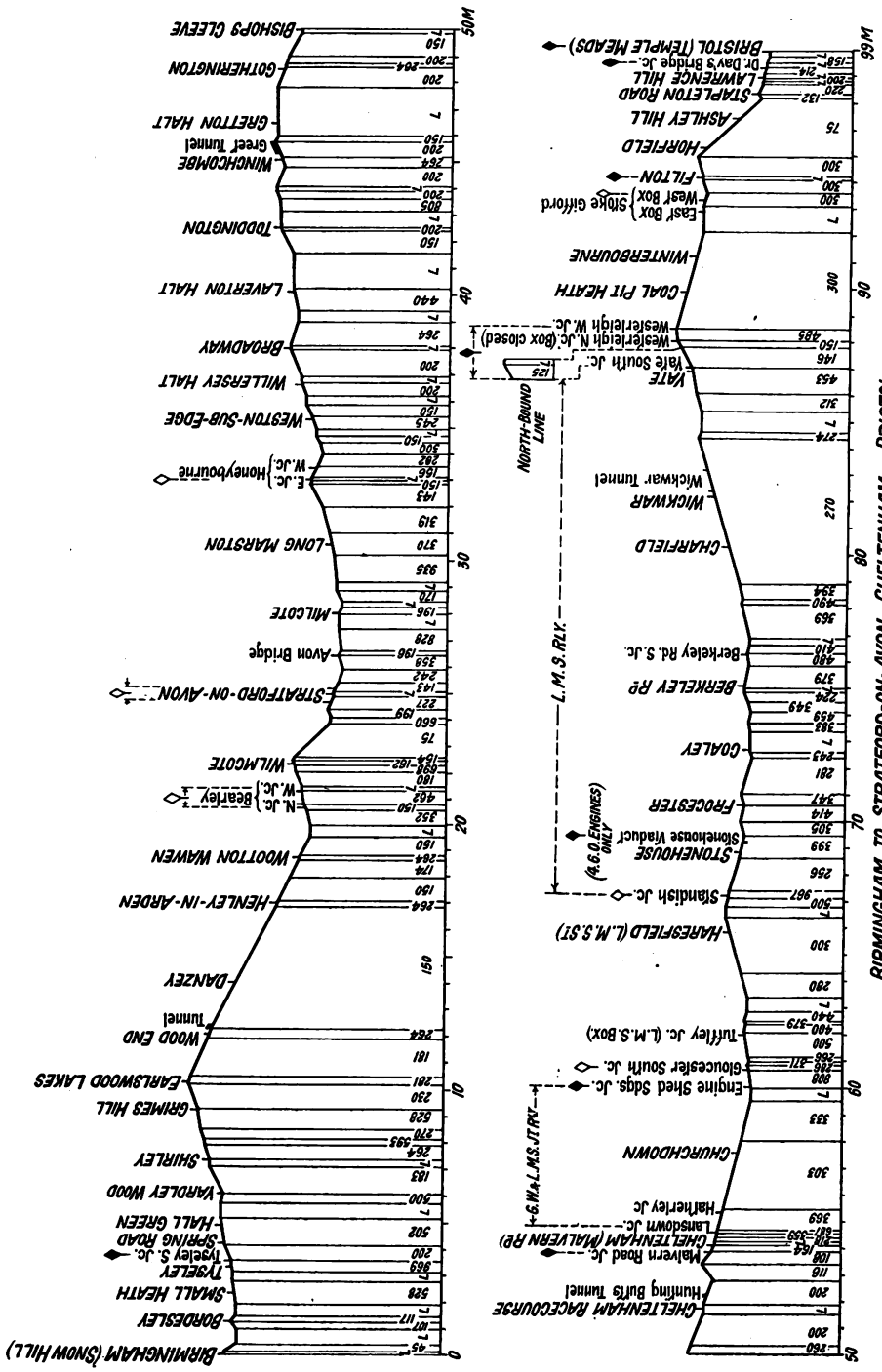

SHEET 12.—GRADIENT PROFILES, GREAT WESTERN RAILWAY.

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wood Lakes. But from there southward the worst continuous bank on the route provides some hard work for north-bound trains. It is 9 miles in length, and for over 6 miles is inclined at 1 in 150. A short ascent to Wilmcote then precedes a descent of 1¼ miles at 1 in 75, also adversely facing north-bound trains as they start from Stratford-on-Avon. From 28½ miles there is an ascent of 9½ miles, on varying grades, to Broadway, broken intermediately by the short descent from the East Junction at Honeybourne, and then for 11¾ miles from near Gotherington to the Severn Valley at Gloucester the line is chiefly on falling grades, mainly easy in character, save for the sharp rise and fall into Malvern Road Station at Cheltenham. Over the L.M.S. metals from Standish to Yate for a long time no heavier engines than the 4-4-0 "Counties" were permitted, but the rule has now been relaxed in favour of the two-cylinder 4-6-0 "Saint" class engines, which work the chief Great Western trains. These engines are, however, subject to a special speed restriction of 30 m.p.h. over Stonehouse Viaduct. There are no other difficulties on the L.M.S. section, other than 7½ miles of Wickwar bank, for 5½ miles at 1 in 270; it is preceded by severe slowings at Gloucester (where the G.W. expresses avoid the town by a spur line on the east side) and Standish, and followed by the Yate and Westerleigh slacks. From Westerleigh West Junction into Temple Meads the route is the same as that followed by the two up Bristol two-hour expresses to Paddington. It falls at 1 in 300 to Stoke Gifford, and then for 2¼ miles very sharply at 1 in 75 down Ashley Hill bank into Stapleton Road Station. The locomotive work performed over this most difficult route is at all times extremely creditable, but particularly so during the height of the summer, when very heavy loads are carried by the express trains between Wolverhampton, Birmingham and the Devon and Cornwall coast resorts.

DISTANCES.

Mile-posts, up (west) side, Tyseley S. Jc. (zero) to Bearley W. Jc.; up side, Bearley W. Jc. to Honeybourne N. Jc. (zero); up side, Honeybourne E. Jc. (zero) to Cheltenham (Malvern Rd.); down side, Cheltenham to Standish Jc. (from zero at Paddington via Swindon); up side, Standish Jc. to Yate (L.M.S. posts from zero at Derby); up side, Westerleigh W. Jc. to Filton (from zero at Paddington); down side, Filton Jc. to Temple Meads (zero).

		Miles.
BIRMINGHAM (SNOW HILL)		0·0
Bordesley		1·3
Small Heath		2·3
TYSELEY		3·3
Spring Road		4·2
Hall Green		4·8
Yardley Wood		6·1
Shirley		7·3
Grimes Hill Platform		9·2
Earlswood Lakes		10·2
Wood End		12·2
Danzey		14·0
HENLEY-IN-ARDEN		17·0
Wootton Wawen Platform		18·7
Bearley North Jc.		20·7
Bearley West Jc. (up)		21·3
Wilmcote		22·3
STRATFORD-ON-AVON		25·0
Milcote		28·0
Long Marston		30·6
Honeybourne East Jc. (up)		33·0
Honeybourne West Jc. (up)		33·5
Weston-sub-Edge		35·3
Willersley Halt		36·7
Broadway		38·0
Laverton Halt		40·1
Toddington		42·5
Hayles Abbey Halt		43·5
Winchcombe		45·1
Gretton Halt		46·5
Gotherington		48·5
Bishop's Cleeve		50·0
Cheltenham Racecourse		51·8
CHELTENHAM (MALVERN RD.)		54·1
Lansdown Jc. (down)		54·6
Hatherley Jc. (down)		55·3
Churchdown		57·5
Engine Shed Sidings Jc (up)	60·0	60·0
GLOUCESTER (G.W.R.)	60·9	
Gloucester South Jc. (up)		60·8
Tuffley Jc. (L.M.S., up)		61·9
Haresfield (*L.M.S., up*)		65·7
Standish Jc. (up)		67·1
Stonehouse		68·7
Frocester		70·5
Coaley		72·6
Berkeley Road		75·0
Berkeley Road S. Jc. (up)		76·2
Charfield		80·2
Wickwar		82·1
Yate		86·9
Westerleigh West Jc. (up)		88·3
Coalpit Heath		89·7
Winterbourne		91·0
Stoke Gifford East Jc. (down)		92·7
Stoke Gifford West Jc. (up)		93·2
FILTON JUNCTION		94·0
Horfield Halt		95·1
Ashley Hill		96·3
STAPLETON ROAD		97·2
Lawrence Hill		97·8
Dr. Day's Bridge Jc. (down)		98·1
BRISTOL (TEMPLE MEADS)		98·8

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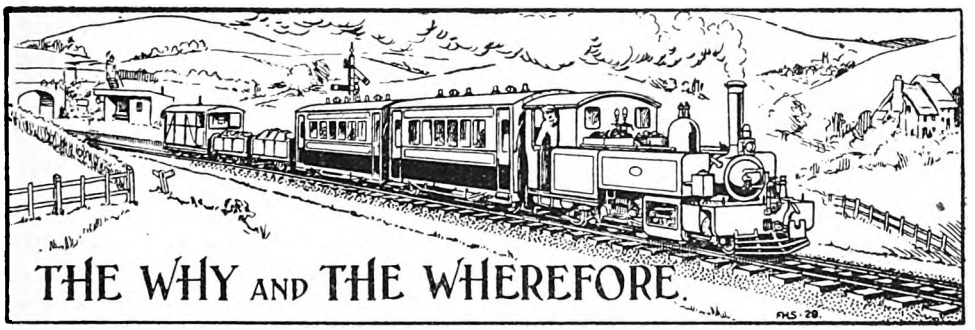

Railway Magazine *readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to the dimensions and weights of railway rolling-stock and to names, numbers, dates, &c., of locomotives should not be forwarded. No reader should send more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history or "grouping," the pages of the "Railway Year Book"* (5s. *net*) *should be consulted. The thirty-second Annual Edition* (1929) *of this standard railway reference work is now published. All previous Editions are out of print.*

The Great Chesterford and Newmarket Railway.

Commenting upon the reply in the April number, the Rev. H. P. Hart writes as follows: "The line was opened some time between January and August, 1848. I have a January *Bradshaw* in which it does not appear and an August one in which it does. The stations were: Chesterford, Bourne Bridge, Balsham Road, Westley, Dullingham, Newmarket. The length of the line was 18 miles, and there were four trains each way. Connection between Newmarket and Bury was made by coach. The line is marked on the *Bradshaw* map—and the proposed railway from Cambridge to Dullingham is also marked. As I have not a *Bradshaw* for every month, I cannot tell exactly when the line was closed—perhaps some other correspondent could tell us, as it would be interesting to know—but it was still open in October, 1851, when there were three trains each way, but the section in *Bradshaw* is headed 'No Information. Accuracy Uncertain.' My next *Bradshaw* is November, 1852, and by then the line was closed and the present Cambridge-Newmarket line, with the exception, of course, of the present junction with the main line—the Newmarket branch left Cambridge somewhere about the middle of the station platform—was opened. At that time there was a station at Cherry Hinton, between Cambridge and Fulbourne. The line was opened to Bury between January and May, 1854, and in my May, 1854, *Bradshaw*, Cherry Hinton station has disappeared."

[Further reply to BM/NSOF.]

Track Maintenance Indications.

A horizontal green board, with one end pointed and the other end fishtailed, illuminated at night with green lights side by side, indicates that operations are in progress on or under the track, necessitating a reduction of speed. This is fixed roughly ½ mile from the location of the slack; the actual commencement of the restriction is indicated by the letter "C," and the termination by "T," both illuminated at night. Small white posts, fixed at the eide of the track, with horizontal arms pointing in one direction or the other along the line, are used to mark the ends of recently relaid sections of track. Vertical posts at the track side, marked with graduations of height, are sometimes employed in the neighbourhood of subsidences in coal-mining areas, so that it may be seen readily whether or not any movement has taken place in the track.

[Reply to Eric Cope.]

Three-Departure Terminal Stations.

In addition to Southport (Chapel Street), which, as indicated in the timetable puzzle given last month, has three trains leaving at 8.5 a.m., it is possible for three trains to depart simultaneously

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from Liverpool Street, Waterloo and London Bridge (terminal portion) Stations in London ; four from Victoria, if the two sections are included ; and, so far as our recollection will permit, three also from Victoria, Manchester (east end), and, if Mayfield Station is included, from London Road, Manchester. There are, of course, a number of double-ended stations which would permit of three or four simultaneous departures, if both ends are included. We do not know if any other reader can suggest any further examples.

[Reply to J. M. DRYSDALE.]

Re-boilered Pacific Locomotive, L.N.E.R.

When it became necessary to re-boiler Raven Pacific locomotive No. 2404 of the L.N.E.R., one of Mr. Gresley's standard-type boilers, as fitted to the Doncaster-built engines, was used, and the locomotive modified accordingly, in order to secure the full advantages of interchangeability of parts between the various Pacifics in use on the L.N.E.R. Presumably it was found more convenient to use a boiler working at 180 lb. per sq. in., with the result that the original boiler pressure has been reduced by 20 lb. The total heating surface of the original boiler was 2,874.6 sq. ft., including superheater, that for the new boiler being 3,455 sq. ft. The corresponding evaporative surfaces are 2,364.7 sq. ft. and 2,930 sq. ft. respectively.

[Reply to H. L. SHAW.]

Heating Trains by Steam.

Steam used for train-heating purposes is passed through a pressure-reducing valve before entering the continuous pipe running along the train. The quantity of steam actually used, therefore, is comparatively small, and in common with the steam used for the vacuum ejector and other auxiliaries, blower, &c., does not have any appreciable effect upon the haulage power of the locomotive ; certainly not enough to justify, for that reason alone, the addition of one or more coaches to a train during the summer months.

[Reply to H. DIXON HEWITT.]

The Famous Bridges Route.

The fact that the East Coast route from London to Aberdeen includes so many notable bridges and viaducts causes it sometimes to be described as "The Famous Bridges Route" or "The Great Bridges Route." It is distinctly of interest, as you point out, and it includes the Welwyn Viaduct, Newark Dyke Bridge, the Ouse Bridges at Selby and Naburn, the King Edward Bridge at Newcastle, the Royal Border Bridge at Berwick, the Forth Bridge, the Tay Bridge and the Dee Viaduct at Aberdeen, to which might be added Durham Viaduct.

[Reply to T. W. LINSELL.]

G.C. 4-4-2's, L.N.E.R.

The general understanding is that only the principal present-day locomotive classes on the L.N.E.R. are to be painted green. The large Great Northern and the North British and North Eastern "Atlantics" are, presumably, still regarded as present-day standard passenger classes, and the fact that the Great Central 4-4-2's are now painted black must be accepted as suggesting that they are now regarded as a secondary class, although we quite appreciate the splendid work which these former "Jersey Lilies" have done in the past and are still doing.

[Reply to "W.13 RYDE.]

Working of Injectors.

When the amounts of steam and water being admitted to a live-steam injector are not properly graduated, the steam and water do not combine, with the result that there is a discharge from the exhaust pipe. This discharge disappears when the steam and water valves are correctly adjusted. A certain amount of steam and water will sometimes overflow from an injector through the exhaust pipe when it is being started or shut off for the same reason.

[Reply to F. WARD.]

Continental Railway Gauge.

We are indebted to Mr. Tage L. Lasson, of Denmark, for information to the effect that the standard Continental gauge (except in Russia, Spain and Portugal) is 1.435 mètres, or 4 ft. 8½ in., and that it is only on certain French railways that the width has been increased to 1.440 and 1.450 mètres (the last-named being 4 ft. 9 in.). Russia and Finland

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have a gauge of 1.524 métres and Spain and Portugal of 1.676 métres.

[Further reply to J. M. INNES.]

Up "West Coast Postal."

The up "West Coast Postal" leaves Aberdeen as a passenger train to Perth at 3.25 p.m., leaving Perth as a special train at 5.24 p.m. Calls are made at the same stations as on the down journey, Stirling, Law Junction (to attach the portion leaving Glasgow 6.35 p.m.), Carlisle (8.55-9.5 p.m.), Preston, Warrington, Crewe (12.19-12.31 a.m.), Tamworth and Rugby, and Euston is reached at 3.55 a.m.

[Reply to T. H. KIPLING.]

Havre Boat Express, S.R.

This train leaves Waterloo 9 p.m., calls at Surbiton (9.19-9.20 p.m.), Basingstoke (10.6-10.9 p.m.), Winchester (10.35-10.37 p.m.) and Eastleigh (10.47-10.50 p.m.), reaching Southampton Terminus at 11.3 p.m. The corresponding up working is at 7.18 a.m. from Southampton Dock Gates, calling only at Basingstoke (8.3-8.6 a.m.), and reaching Waterloo 9.3 a.m.

[Reply to R. K. GREENHALGH.]

Raven "Pacific" Engines, L.N.E.R.

Certain modifications were made to these engines after construction which raised their weight from the original figure of 97 tons (without tender) to the present figure of 101½ tons, except in the case of No. 2404, *City of Ripon*, which has been reduced to 98 tons by the substitution of the Gresley boiler. Mr. Allen's reference, which you quote, was based on the original weight.

[Reply to V. WINCHESTER.]

L.N.E.R. Locomotives.

"Pacifics" Nos. 2576, *The White Knight*, and 2580, *Shotover*, are fitted with the "A.C.F.I." feed-water heater, seen externally above the front end of the smokebox. No. 10000, the new high-pressure water-tube boiler engine, is strictly of the "4-6-2-2" and not of the "4-6-4" type. We have no information as to the tractive effort of this engine when working compound.

[Reply to D. H. MILES and W. QUINTON.]

Locomotive Cut-off

Cut-offs much below 15 per cent. with ordinary valve-motions are undesirable, owing to the excessive back pressure so caused in the cylinders, with consequent risk of heating the big-ends, &c. We have not space to explain this in detail, but you will find the subject discussed at length in such text-books as Mr. Cecil J. Allen's "Railways of To-day."

[Reply to D. M. G. CLARKE.]

Movable Diamond Crossings.

Crossings of this type are arranged with four switch-tongues at the centre of the diamond, which move in such a way that a train crossing the diamond in either direction runs on continuous rails throughout, instead of across the customary flangeway gaps. Movable diamond crossings are commonly used in America, but their use in this country is confined chiefly to the Great Western Railway.

[Reply to J. M. C.]

L.N.E.R. Bradford Expresses (G.C. Section).

Haulage of these trains between Sheffield and Bradford (Exchange) is undertaken by the L.M.S. Company (Central Division), as from Plaistowe onwards L.M.S. metals are traversed. The error you mention in the titling of a locomotive photograph at Dover was due to a printer's transposition of figures.

[Reply to C. R. M. COYSH.]

"Collar-work."

The use of the term "collar-work" in connection with locomotive performance is simply borrowed, by way of metaphor, from the roads. Just as the horse pulls hard against the collar uphill, so hard and continuous locomotive pulling—and particularly high speed work on adverse grades—is dubbed "collar-work."

[Reply to C. L. JAMBLIN.]

L.M.S.R. 4-6-0 No. 3168.

As reported in these pages some time ago, this engine was renamed the *London Irish Rifleman*, in order that that regiment should receive attention with the other regiments whose names are borne by further engines of the class. This rendered the name *Fury* available for the new high-pressure 4-6-0.

[Reply to "ROYAL SCOT."]

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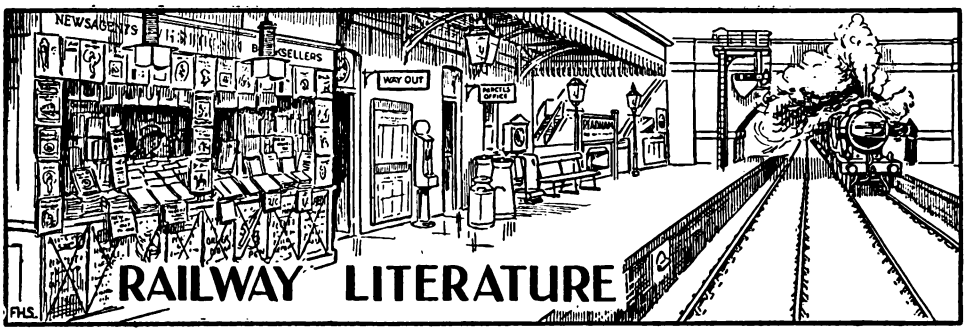

RAILWAY LITERATURE

"RAILWAY GAZETTE" SPECIAL SPANISH RAILWAY NUMBER. Published by *The Railway Gazette,* 33, Tothill Street, Westminster, S.W.1. 116 pp. 144 half-tone illustrations and a map. Price 2s. 6d.

To mark the occasion of the Eleventh Session of the International Railway Congress Association, which this year is being held in Madrid, a Special Spanish Railway Number of *The Railway Gazette* has been prepared. Thanks very largely to the characteristic and unfailing courtesy, and to the willing co-operation, of the Spanish authorities and officers of the principal railways, as well as to the indefatigable industry and wide knowledge of *The Railway Gazette* Spanish correspondent, the Number appears in every way worthy of the occasion of its publication.

Comprising 116 pages of text and illustrations, the whole issue is printed in parallel columns of English and Spanish, a feature in itself of practical value to all railway officers visiting Spain or interested in Spanish railway affairs. The principal contents, apart from the editorial notes, comprise specially-contributed articles on the Railways and the State, the principal Companies, Working Statistics of Spanish Railways, the Railways of Spain, Main-Line Electrification, the Mixed Train in Spain, Railway Terms in Spain and South America, and the Railways of Portugal. There is a double-page railway map of Spain and Portugal, and Majorca, clearly showing all the lines in the peninsula, and the Number concludes with a very useful directory of Spanish railways, giving particulars of mileage, gauge, headquarters, and principal officials.

The outstanding artistic feature of the Number, however, is undoubtedly the collection of typical views of Spanish railways, printed on art paper and occupying 56 pages. This section contains over 140 half-tone illustrations, many of them of exceptional interest and beauty, especially where the wild grandeur of Spanish mountain scenery forms the background. The spacious proportions of Spanish rolling-stock rendered possible by the 5 ft. 6 in. gauge is well shown by the view of the restaurant car on the Northern Railway of Spain. Together, these views constitute a pictorial record of the Spanish Railways which is probably unique.

The whole Number, indeed, is not only an indispensable handbook for delegates to the Congress, but forms a permanent work of reference to the railways of a country which is not so well known as other European countries, but whose communication methods and systems will repay study.

MESSRS. W. FOULSHAM & CO., LTD., of Almanac House, 10 and 11, Red Lion Court, Fleet Street, London, E.C.4, send copies of the accompanying publications:—"The Art of Rowing, Sculling and Punting"; "How to Play Bowls Scientifically"; and "Popular Sporting Games Worth Playing." The cost of each is 1s. net, and they can be commended as handy pocket manuals containing useful and interesting information.

THE RAILWAY AND LOCOMOTIVE HISTORICAL SOCIETY, BULLETIN No. 21. This issue of the *Bulletin* deals almost entirely with the Philadelphia, Wilmington and Baltimore Railroad. It is prefaced by a portrait of Mr. S. M. Felton, President from 1851 to 1863, and a very complete historical survey of the development of the railway in question, with statistical and other information, occupies the greater part of the issue. Remaining contents include some comments by Mr. Inglis Stuart, and illustrations of various locomotives in use on the Philadelphia, Wilmington and Baltimore Railroad, and other news of interest.

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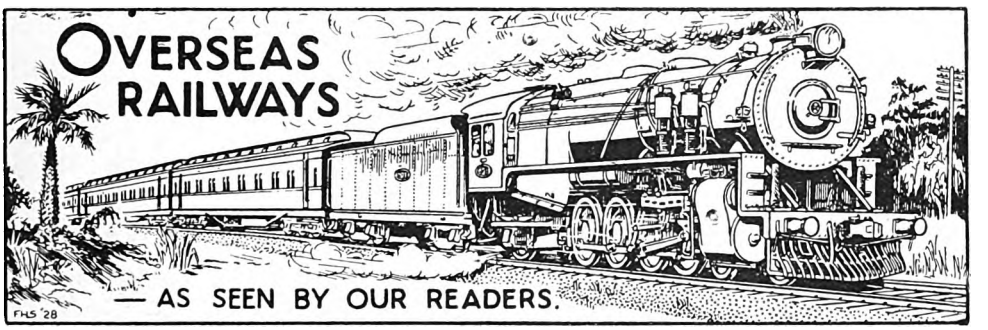

Correspondence for this section, with or without photographs, is invited.

Notes on Danish Railways.

FROM the introduction of the summer time-tables on the Danish State Railways, on May 15, a new goods line through the northern and western outskirts of Copenhagen will replace the old line at present in use, and result in the abolition of fourteen level crossings, many of them over busy roads with tram lines, &c. Works on the new line include eight road bridges, four railway bridges and three out-of-level crossings with existing railway lines, besides about 400 yards of viaduct, including a high-level passenger station and a large new goods yard. The total length of the new part of the line, which is double track throughout, and which joins existing lines at both ends, is about five miles. All bridges are of reinforced concrete. Part of the new line will also carry passenger traffic. The Danish Parliament has to-day (April 4) sanctioned the electrification of the three most important suburban lines of the Danish State Railways—viz., Valby-Copenhagen H., Hellerup to Klampenborg or Holte, and Frederiksberg-Vanlöse-Hellerup—a matter of about 22 route miles. Current will be supplied by overhead wires at 1,500 volts D.C., and multiple unit trains, consisting of one or two three-car sets, if necessary with one extra trailer, will be used. A 20-minute service will be given on all three lines on the basis of a "stiff" time-table, repeating itself in every 20-minute period, and augmented as necessary at rush hours. Several peculiar operating conditions will be encountered, notably the necessary reversal of trains at Vanlöse. Five new stations will be built and extensive alterations will be necessary at several of the existing ones. Several level crossings between Hellerup and Holte are to be replaced by bridges, entailing some large earthworks, while it will also be necessary to double the line from Holte to Hilleröd, as steam trains on this route will have to work on the same tracks as the electric trains between Holte and Copenhagen H. Automatic blocking and signalling will be introduced on part of the lines. The first electric trains are expected to run in 3½ years' time, and the cost of these works, including the new rolling stock, is estimated at about 1.3 million sterling. This will constitute the first railway electrification in Denmark, and as such its completion is awaited with great interest.—[JAMES STEFFENSEN.]

Light Signals in U.S.A.

THE position light signal is a favourite signal on the Pennsylvania. Instead of having colour light signals, displaying red for stop, yellow for caution, and green for proceed, a system of three lights is used in three positions. When the three lights are in vertical position, it is a proceed signal; when the lights appear in a 45-degree angle, it is a caution signal; and when the lights are in horizontal position, it is a stop signal. The Baltimore & Ohio combines colour and position in their signal aspects, but they use two lights instead of three. When two green lights are displayed vertically, it is a proceed signal; when two yellow lights are displayed in a 45-degree angle, it is a caution signal; and two red lights appearing horizontally is a stop signal. The Pennsylvania signals preclude the danger of colour blindness on engineers, and the Baltimore & Ohio signals have the advantage of using red for a stop signal, which is a clear and effective warning for a stop signal. The Pennsylvania uses a signal aspect in the cab of the locomotives which displays the same aspect as the signal outside, and greatly reduces the chance for engineers to miss signals in fog or inclement weather. I am not sure that many other roads have this device, although there are variations of it in use on several eastern

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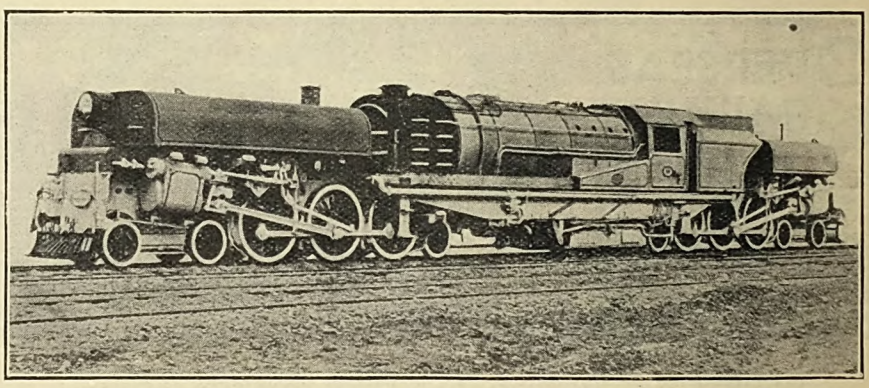
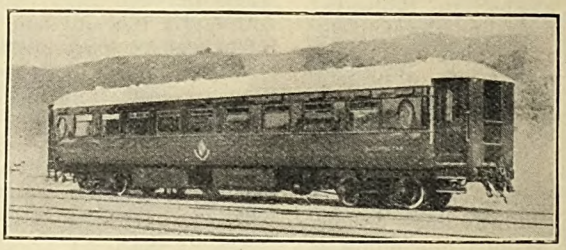
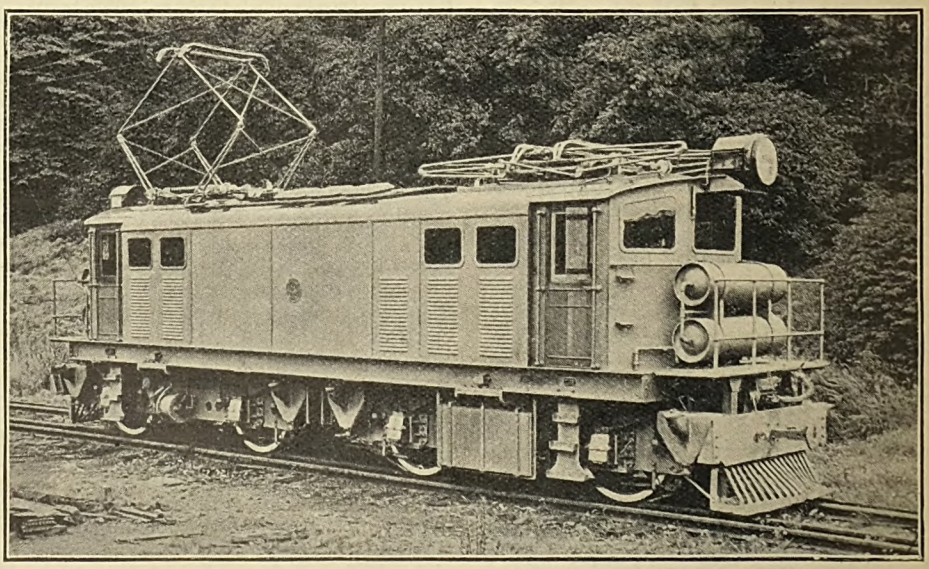


GARRATT 4-6-2-2-6-4 LOCOMOTIVE.



NEW SLEEPING CAR AS USED ON NORTH ISLAND "NIGHT LIMITED" EXPRESS.



CHRISTCHURCH-LYTTELTON ELECTRIC LOCOMOTIVE.

SCENES ON THE NEW ZEALAND GOVERNMENT RAILWAYS.

(*Photos by F. H. T. King*).

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roads, and all the leading roads are studying safety appliances, and installing them as fast as conditions permit.

[PAUL F. LANING.]

The New Zealand Government Railways.

MR. F. H. E. KING, writing from Nelson, New Zealand, sends some interesting material in regard to the New Zealand Railways, together with the three photographs reproduced on page 478, which show, respectively, a 4-6-2-2-6-4 Garratt engine built by Messrs. Beyer, Peacock & Co. Ltd., three of which are now in service ; a sleeping car as used on the North Island "Night Limited" express from Auckland to Wellington ; and an electric locomotive as used on the Lyttelton-Christchurch section, South Island. Mr. King also refers to two new trains, each of eight cars, recently constructed for the Auckland-Rotorua express service. They correspond generally to the sleeping car illustrated as regards general appearance. He also sends some folders issued by the New Zealand Government Railways, a copy of a voluminous and very informative booklet on "Cheap Christmas and New Year Holidays by Rail," a copy of the New Zealand Government Railways' time-table, and several posters. These include one designed to attract attention to Labour Day excursions run October 25 to 28 last, another being "The Height of Happiness" (directing attention to ascent of Mount Cook, 2,439 ft.), and larger colour posters dealing with Rotorua, "New Zealand—the Sportsman's Paradise" (illustrating deep sea fishing), "New Zealand for your next Holiday" (showing a Maori Belle), a night scene on the line, "Come to New Zealand this Summer" (a geyser scene), New Zealand fiords, and "Russell Bay of Islands."

Continental Railway Notes.

RAILWAY MAGAZINE readers who visit the exhibitions in Belgium this summer will be able to see, in Brussels, the remarkable progress that has taken place in the last few years in the institution of all-Pullman trains on the Continent. Pullman trains abroad have certain advantages which British Pullman trains do not possess, for not only is the "extra fare" train a familiar feature abroad, but the Pullmans, in most cases, offer a distinct saving in time over the ordinary service, better catering, the avoidance of certain "Customs" inconveniences, and accommodation for more hand-luggage than can conveniently be carried in ordinary compartments—a material gain to the passenger where the "free" allowance of luggage (in the vans) is small or none.

The Midi station at Brussels accommodates the two Pullman trains from Paris—the "Etoile du Nord," Paris-Amsterdam train ; and the "Oiseau Bleu," Paris-Antwerp service. Both run non-stop between Paris and Brussels in 3½ hours, worked by "Nord" engines, of course, and are 10 minutes faster than the best "ordinary" (first and second class) train—the 9.10 a.m. from Paris, which takes 3 hours 40 minutes to Brussels with a stop at Aulnoye. The "North Star" is formed usually of 8 Pullmans and 2 bogie vans, with a total seating of 112 first and 176 second, four kitchens being provided. Half the train is left at Brussels, and from Brussels to Amsterdam the load is 4 Pullmans and van (56 first and 89 second seats). The first-class cars seat 24 or 32 passengers ; the seconds, which are extremely comfortable and roomy, 36 (occasionally 38) or 51, and the tables, on either side of the centre passage, are for 4 and 2 passengers only, instead of (as in many of the narrower third-class Pullmans in Great Britain) for four on either side. The "Blue Bird" train, when last seen early in April, consisted of 4 first-class cars (112 seats), 2 seconds (89 seats), and 2 bogie vans ; this "set" makes a double trip daily between Antwerp and Paris, going southwards at 9.30 a.m. from Antwerp and 10.30 from Brussels, and returning from Paris at 6.5 p.m.—[R. E. CHARLEWOOD.]

Canada's Fastest Train.

TRAVERSING 334 miles between Montreal and Toronto in 360 minutes, including stops, it is claimed that the "International Limited," Canadian National Railways, is "the fastest train in the world for a similar distance." This is stated in announcing new schedules between Montreal and Chicago, the daily route of this express. By the new table 848 miles will be covered in 18 hours 15 minutes, and enables rapid connection from St. Lawrence seaports to Canadian and United States western points. Faster schedules are also announced for the "Confederation" and the "Continental Limited," crossing the Dominion to Vancouver from Toronto and Montreal respectively. The "International Limited" has been in daily operation for 30 years. The average train of steel coaches approximates 1,000 short tons d.w. Two locomotives only are required for each run, the change being made at Port Huron, Michigan, and Sarnia, Ontario, the border points.

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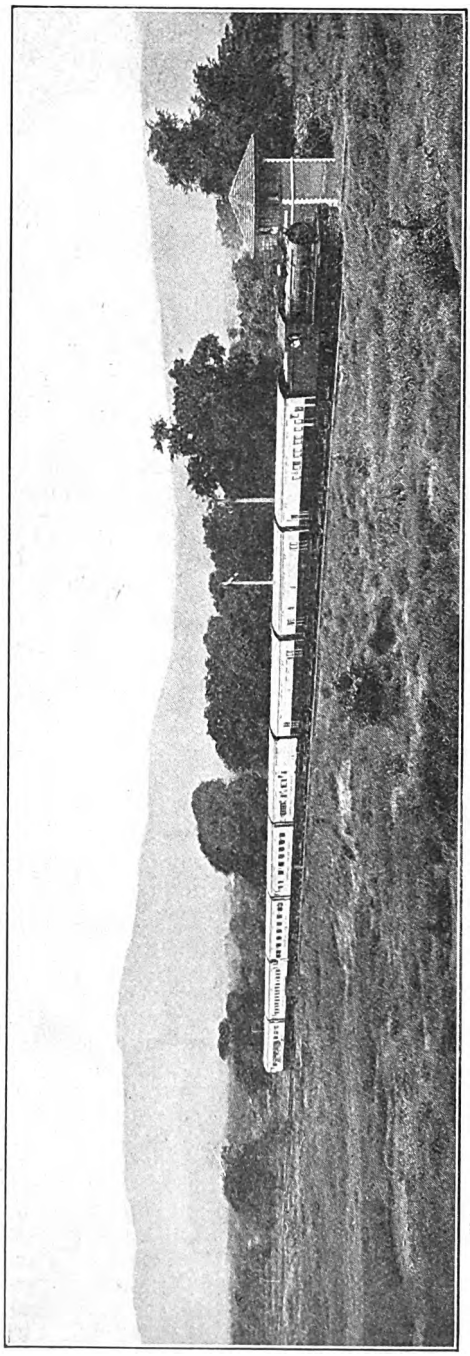

VIEW OF "IMPERIAL INDIAN MAIL," EAST INDIAN RAILWAY, ON RUN BETWEEN BOMBAY AND CALCUTTA.

Steel Sleepers.

In your April issue, Mr. B. Walmsley, Chairman of the Steel Sleeper Committee of the National Federation of Iron and Steel Manufacturers, gives some very interesting notes on the use of steel sleepers by the German Railway Company.

The most recently published statement by the German Railway gives the following information, which bears out Mr. Walmsley's statement:

1. Superstructure K on wooden sleepers—	
With 15-m. rails..	810
With 15-m. rails welded into 30-m. sections	5
With 30-m. rail of an unbroken length	1,095
2. Superstructure K on metal sleepers, with electrically-welded bearing plates and 15-m. rails	1,430
Total	3,340

All these tracks are laid with rails with cross-section S 49, weighing 48.89 kg. per metre, which is the heaviest standard type at present employed by the company. It is to be noted that none of the long 30-metre rails, which the German Railway is now using, are being laid on steel sleepers, and it is stated that this policy has been adopted "with a view to increasing the comfort of passengers by greater smoothness of running."

Mr. Walmsley is quite correct about the difficulty of using steel sleepers in the Ruhr or other districts where chemical fumes exist in the air and lead to corrosion; unfortunately, this situation results in a very heavy cross haul, since timber has to be brought from East Prussia, or for other long distances, and steel sleepers made in the Ruhr have to be hauled long distances before they can be employed in the track.

While 1929 figures show an increased percentage of steel sleepers compared with 1928, it must be remembered that metal sleepers have been used on the various German State Railways for many years, and as early as 1914 31 per cent. of track was fitted with them; it is doubtful if the present percentage figure is as much as 40 per cent.

There can be little doubt that metal sleepers have militated against the use of track circuiting in Germany, and few German Railway engineers will agree with the claims made by Mr. Walmsley in favour of steel. The trials with a very expensive ballast core-making machine on which to lay the steel sleepers bear witness to the difficulties their use involves, and only last year a party of German Railway officials visited this country to study how a good "top" could be kept to the permanent way.

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A study of comparative costs of wood and steel is at present being undertaken, and so far no figures have been produced to show that the cost of steel track is less expensive than that of a wooden sleepered one, and the former has certain very serious disadvantages, such as the impossibility of their use with slag ballast.

[C. E. R. SHERRINGTON.]

British Locomotives in France.

WITH regard to Mr. Happe not having seen British engines in France excepting the 4-6-4 tanks he mentions, there are 4-6-0 engines built by the North British Locomotive Co. of a design similar to the late Mr. Peter Drummond's "Castles" on the Highland division of the L.M.S.R. The writer saw these in Rouen last year, and had a minute inspection of them. They were built before the war and have tenders as in the case of the Highland and G. & S.W. engines. They have steam reversing gear similar to that the brothers Drummond adopted. At Nantes there are a number of 2-4-0 engines with wheels about 6 ft. 6 in., with outside cylinders and a peculiar sleeve valve which is worked by Allan motion. I may add that a separate exhaust valve is also actuated by the same gear. It is somewhat similar gear to Corliss, only, instead of a ventplate, there is a bevel quadrant which oscillates the exhaust valve. I forget the patentee's name; it was on a plate on the engine. I think the engines were built by Cail & Cie., Paris. I may say that the French depots are very well kept and some very old engines still are working about Bordeaux and Nantes, some by Schneider & Cie., 1870.

[M. M. NIVEN.]

Cheap Excursion Trains in New Zealand.

MR. F. H. E. KING, of Nelson, sends particulars of cheap excursion facilities in New Zealand, which compare interestingly with what is done in this country. They apply to a week-end excursion to Rotorua on February 28, the train leaving Wellington at 4.30 p.m., Palmerston North at 7.27 p.m., and arriving Rotorua at 7.46 a.m. on Saturday. The return train left at 5.30 p.m. on Sunday. The accommodation, one class only, and consisting entirely of first-class carriages and sleeping car, was provided at a return fare from Wellington of £2, with facilities from other stations at the second-class single fare less 10 per cent., these covering journeys to connect with the excursion train. There are also regular excursion trains between Wellington and Palmerston North, for which the first-class fare is 7s. and the second-class fare 5s. Mr. King points out that the distances for these two trips are: To Rotorua, 428 miles; and to Palmerston North, 87 miles—distances for which the fares charged are distinctly moderate.

Notes on Dutch Railways.

WITH reference to the notes on Dutch Railways appearing under the above heading in the April issue, I should like to point out that the coaches for the Amsterdam-Rotterdam electric service are not painted cream as stated, but green below the waist with cream upper panels. Your correspondent's notes also lead one to suppose that all restaurant and sleeping cars in Holland are Mitropa cars. Such, of course, is not the case, as Mitropa cars are only run on trains to and *via* Germany, all other services within Holland itself and to and *via* Belgium being operated by the International Sleeping Car Company. The latter company also provide the sleeping cars running from Amsterdam to join the Ostend-Vienna Orient Express at Cologne. The following figures based on the 1929-1930 winter services may be of interest:

MITROPA COMPANY.

Sleeping car services operated	16
Restaurant car services operated	20
First-class saloon car (HookèBerlin)	2
First and second-class salloon car train ("Rheingold" Express) HookèBale, (ZurichèLucerne at certain seasons) ..	2

("Rheingold" cars are owned by the German Railways Company, but operated by the Mitropa Company.)

INTERNATIONAL SLEEPING CAR COMPANY.

Sleeping car services operated	4* (International).
Restaurant car services operated	22 (within Holland).
Restaurant car services operated	4 (International).
First and second-class Pullman train ("North Star")	2

* Certain services are not operated on Sundays in Km.

Various kinds of stock are to be seen on the International Sleeping Car Company's services from the older sleeping and restaurant cars of teak construction to the new all-steel cars painted dark blue.

[ARTHUR M. L. RUSSELL.]

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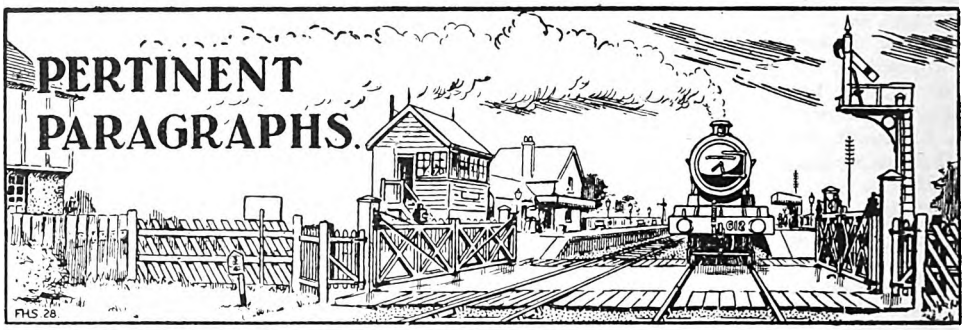

Exchange Station, Liverpool.

Mr. F. Hewitt sends the following interesting notes:—" Two points in the article dealing with Exchange Station, Liverpool (see March, 1930, issue), were suggestive of interest in connection with 'foreign' engine working over the old Lancashire and Yorkshire Railway. First of all, the mention of the through services to Hellifield in connection with the Midland line Scottish expresses. It is, perhaps, not generally known outside this district that certain of these trains were Midland-hauled between Exchange and Hellifield in years gone by. The late Mr. E. L. Ahrons referred to this arrangement some ten years ago when dealing with the Midland in 'Locomotive and Train Working in the latter part of the Nineteenth Century' series of articles in the Magazine. I have no knowledge as to when the duty started, or for how long it was operative, but it was certainly in operation for many years, and quite possibly up to the War period. I have always understood that six Johnson 4-4-0 engines were entrusted with this work, and were stabled at Bank Hall (L. & Y.) depôt. Whilst admiring some of the 'visitors' at Walton (C.L.C.) shed on Grand National day recently, however, an old L. & Y. driver engaged me in conversation, and in the course of his remarks mentioned that ten of the engines were kept at Sandhills (as Bank Hall was formerly known), although the crews and maintenance gangs were sent over from Walton-on-the-Hill. There may possibly have been some goods workings over the Liverpool-Blackburn-Hellifield line, in addition. I should rather like to know."

Mr. Hewitt also sends some lengthy but extremely interesting comments on the working of Grand National traffic, but unfortunately space and the lapse of time since then will not permit of detailed reference, though the trouble taken by him and others who have written describing their Grand National observations is greatly appreciated.

Crewe Locomotive History.

The same correspondent also writes:—" In connection with the notes on p. 307 in the April Railway Magazine relating to Crewe-built engines, I notice the common mistake of referring to Allan as a designer of locomotives for the Grand Junction and L.N.W. Railways. It has been authoritatively shown that Allan was 'Foreman of the Locomotives at Crewe,' whatever that means. Trevithick, son of the pioneer 'Dick' Trevithick, was the engineer responsible for the design and construction of Grand Junction locomotives between 1841 and 1846 when it became the Northern Division of the L.N.W.R., and Trevithick's name alone is preserved in the records at Crewe in all matters relating to locomotives constructed until Mr. Ramsbottom took control in 1857.

" It is very interesting to note that the first 1,000 engines from Crewe were 21 years in making their appearance, and that while intervening 'thousands' have been achieved in much shorter periods, the sixth and latest 'thousand' has again turned up in a period of 21 years. The first 'thousand' bridged the time in which Crewe progressed from being the locomotive works of the Grand Junction Railway to that of the L.N.W.R., and 'Crewe' types rapidly replaced several hundred heterogeneous locomotives of the absorbed companies. This last break of 21 years has again seen great changes, and a change of name on the stationery. Once again standard types are being rapidly produced to supersede many designs, but in some respects it is a bitter pill for some of us to find that we can no longer speak of 'Crewe' types. It seems as if the last of Crewe's engines has appeared."

Reminiscences of a Retired G.W.R. Superintendent.

Mr. W. E. Edwards writes:—" I note, with very great interest, an article in the current issue relating to Westbury, a place familiar to me since about 1869. As to the

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'pointsmen' referred to, their official designation was that of 'switchmen,' but as they wore (until King Edward's coronation) the full uniform of the Company's police, they were so termed by the staff, although the more familiar term 'bobby' was frequently in request. The men continued to be so classed after the general introduction, in 1876, of signal cabins, the uniform was long after retained, and 'duty papers' similar to those of the general police force were also retained in the cabins.

"Your writer refers to the old Chippenham and Salisbury Goods, which I have good reason to remember. A reference to an old contribution upon the Wilts & Somerset line contains a photograph of engine *Nemesis*, taken when at work in this train, and the fireman (Thos. Smith) shown thereon now resides at Southall; he was taken off the Chippenham work in 1873. The driver depicted was concerned in the Wilton accident in 1873, and again, with same train, in the Holt Junction mishap at Christmas of 1874-5. The guard mentioned (Gain) was in charge in both cases; I knew all these men. This train in most cases ran two trips only up the Warminster bank, but occasionally three, and not four. More often the second trip was a 'double,' as they called it, whenever a bank engine was available. The hours of duty are in no wise exaggerated in the article, and it is true that the men regarded such as 'all in the day's work.' I can give an instance of this. Up to June, 1874, a B.G. tank engine was kept at Bath, the regular one being the old *Sun* of 1840. Her driver was a very old servant of the Company, who was killed in the Wilton accident mentioned. The Bath engine worked into Bristol at 7.30 a.m., and thence worked locally to Chippenham and back. At 1.30 they started for Salisbury, reaching Bristol again 9 p.m. Then the engines and coaches returned to Bath! This was a daily occurrence, with one driver and fireman only. On Sunday the boiler was cleaned by the same men, although no running took place on that day. There were intervals in the daily working of the train, including a full two hours at Salisbury. I had the run of the yard at Warminster Station, and at 11 years of age had learned the block, needle telegraph, and the working of points, &c., outside, whilst I sometimes ticked off the repeated 'crossing orders' from Westbury or Wylye respectively. At this station, and others, the main line points, worked by capstans, were padlocked by the policemen, and it was strictly contrary to rule if any other person operated them. By the by, I used sometimes to ride upon the *Nemesis* to Westbury and back when the second trip was made and with the men depicted by the photograph."

We have also received the following interesting notes from Mr. H. F. Kelley, Stationmaster, North Road, Plymouth:—

"In reading through the interesting reminiscences by the late Mr. G. Grant, I see that on page 349 it is stated that in the very early days my grandfather was stationmaster at Steventon, and in 1851, at the time of the Hyde Park Exhibition, he was in a similar position at Oxford. For your information I may say that my grandfather joined the service of the Great Western Railway Company in the Secretary's office in August, 1837, and completed 49 years' service with that Company. He received his appointment of Divisional Superintendent in the early part of 1840, and on the opening of the branch line from Didcot to Oxford in the year 1844, he removed to that city, the new branch being added to his district. He was appointed to the Birmingham Division in 1852, to the then Shrewsbury and Birmingham and Shrewsbury and Chester line in 1855, to the London Division in 1860, and when the Great Western Railway Company took over the South Wales Railway in 1865, to that Division; in December, 1868, he again took charge of the Northern Division of the line at Chester and remained in such charge until his retirement from the service. The Board of Directors minuted the following appreciation of his services:—

> 'Mr. Grierson reported that Mr. James Kelley, the Superintendent of the Northern Division, had intimated his wish to retire, after a service of 49 years. Mr. Kelley is the oldest officer now on the staff, and in accepting his resignation the Directors desire to place on record their regret that the Company is to lose the benefit of his valuable services; and their appreciation of the zeal, energy, and ability with which he has at all times discharged the duties of the important and responsible positions which he has occupied during the long period of his connection with the Company, and they trust that he may be spared for many years to enjoy the rest he has so well earned.'

I shall be glad if you will kindly have the reference to Stationmaster corrected in your next issue, as he never occupied that position during his connection with this Company."

Two New G.W.R. Picture Posters.

"Thou art the flower of cities all" is the quotation applied to a new poster on London just issued by the Great Western

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Railway Company. It is a quaint and interesting production—one which will, we think, find much favour with travellers on the Great Western line. Highly coloured, it is designed on the map principle, and we learn that it "was made by Herry-Perry to show some of the main thoroughfares of London and the manner of folk to be found there." This it does often in a most amusing fashion, the figures introduced being typical of the associations for which certain areas are noted. Harley Street, for instance, shows an up-to-date medico sounding the bared chest of a red-haired athlete; a cricketer, very appropriately, poses for "Lords"; a courting couple, a fiery orator, a juvenile swimmer and an equestrian do duty for "Hyde Park," and so on.

The same company are also issuing a new poster devoted to the charms of Brixham, in sunny Devon. The colouring is good, the blue of the sky and the green of the water proving an effective contrast. It should look extremely well on the station hoardings.

The Torquay Branch of the G.W.R.

REFERRING to Mr. J. F. Gairns' article in the April number, Mr. G. N. Southerden points out that at Aller Junction it is the main line which curves away from the branch, though the wording adopted in the article was intended to indicate that at this point the branch left the main line. Mr. Southerden also points out that the photograph reproduced in page 257 shows a train approaching Torquay from the north, and not Paignton as stated. He also adds the following further notes:—"An interesting feature of the layouts of Torre, Torquay and Paignton stations is that which allows the up platform in each case to be utilised by down trains both for arrival and departure. The Torquay facing crossover is shown on the picture on page 257, already mentioned, and my photographs show the corresponding connections at Torre and Paignton. It might also be mentioned that there is a signal-box with siding connections at the Gas Works between Torquay and Paignton; in addition to the level crossing and signal-box immediately north of Paignton there is one a little distance south of the station, also with a signal-box adjacent; there is a level crossing at Goodrington; and there is a siding connection between the Greenway tunnel and Kingswear, and a level crossing some distance south of it—the latter having signals."

Bath Accident, S. & D.J.R.

COL. A. C. TRENCH'S report to the Ministry of Transport in regard to the accident on November 20 last has been issued. The 3.25 p.m. Somerset and Dorset goods train, Evercreech to Bath, ran away down the steep gradient from Combe Down tunnel to Bath Junction, and after being derailed at high speed at the entrance to Bath Yard, collided with and completely wrecked the near end of a building used by Railway Clearing House staff. The driver was seriously injured and died while being taken to hospital, while an inspector on duty in the yard, and a clerk passing through the yard, were caught by the *débris* and killed. The fireman was seriously injured, as also the guard. The majority of the wagons on the train were completely wrecked, and damage was done to the permanent way, though the damage to the engine and to the brake van was surprisingly limited. The train consisted of 37 wagons and a 20-ton brake van, estimated weight 493 tons, and was drawn by 2-8-0 No. 89. The route joins the L.M.S.R. at Bath Junction, and the single line section from Midford to Bath Junction includes about a mile on a steep gradient to Combe Down tunnel, about a mile in length, through most of which the rising gradient continues at 1 in 100. From the end of the tunnel the line falls at about 1 in 50 for two miles to Bath Junction, and thereafter is level into Bath. The section is extensively curved.

The report describes the circumstances and the location in detail. Col. Trench expresses the opinion that there is no question of defective condition or operation of points, signals or permanent way, and there is no doubt that the speed of the train at the moment of passing Bath Junction was much in excess of what was normal or safe, and various witnesses expressed surprise that the train kept to the rails when negotiating the facing points and curvature at this point. The only question, therefore, is as to the cause of the excessive speed. Carelessness or reckless driving is dismissed at once. Overpowering of the engine by the weight of train and/or brake failure is also ruled out, and the inspecting officer comes to the conclusion that the only reasonable alternative is that during the descent from Combe Down tunnel neither of the men on the footplate was in a condition capable of taking any action to control the train.

Tunnel Conditions.

THIS is supported by the evidence of the fireman and the guard that the tunnel was exceptionally hot and smoky, and that after a short distance the fireman had to wrap

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a coat round his head and sit down, after which he remembered no more. It is suggested, also, that both driver and fireman must have been lying on the footplate at the moment of derailment, while none of the nine or ten witnesses who saw the train pass just prior to the accident saw anyone on the footplate. Further, the train was an unusually long time in the tunnel, and the inference is that the engine was labouring heavily. The inspecting officer therefore concludes that both driver and fireman were overcome by smoke and fumes when passing through the tunnel. This view is confirmed by medical evidence in regard to the driver. Certain recommendations are made, though it is explained that the tunnel has been in use for over 50 years without any similar case of the engine crew being overcome by fumes, while engines of the same class have been in use for the last 15 years. Under normal conditions the atmospheric conditions are not such as to involve any risk or anything more than a degree of discomfort, but occasionally conditions were very bad, so that it is conceivable that a combination of adverse factors applied on the occasion in question. Suggestions are advanced as to improvement in the ventilation of the tunnel, and recommendations are made as to changes in train working methods, reduction of permissible loading, the fact that 2-8-0 engines have to work through the tunnel tender leading when travelling towards Bath, owing to their being too large for the turntables available, and other points.

Scottish Locomotives on the L.M.S.R.

MR. A. G. DUNBAR, of Maryhill, Glasgow, questioned information given in the article published under this title in the January and February numbers in regard to whether it was correct to state that Caledonian engines Nos. 1704 and 1706 were now Nos. 17353 and 17354 respectively. Except to the extent that examination showed that we had correctly interpreted the official particulars of renumbering, while the article in question had been passed as correct by the Locomotive Department of the L.M.S.R., we were not able to solve the problem created by Mr. Dunbar's contention that the engines in question should have been described as Nos. 1703 and 1705, instead of 1704 and 1706. Mr. Dunbar then took up with Sir Henry Fowler, Chief Mechanical Engineer, L.M.S.R., and that gentleman kindly had the matter investigated, the result being the following explanation, which will, it is thought, be welcomed by students of Caledonian locomotive history as well as by Mr. Dunbar.

Nos. 703 and 705 were two engines of twenty-five lent to the Government for service overseas during the war. On their return all these engines were given duplicate numbers, as a regrouping of the classes had taken place in the interval and other engines had been given their numbers. They therefore became Nos. 1703 and 1705 in August and September, 1919. In February, 1920, however, two engines of fifty which were on loan from the Government bore similar numbers, and, in order to prevent duplication, the Caledonian engines in question were renumbered 1704 and 1706, retaining these numbers until repainted and numbered 17353 and 17354 in the L.M.S. list. It will thus be seen that our article was correct in associating Nos. 1704 and 1706 with the new numbers stated, though it was not concerned with the individual histories of engines considered and no attempt was made to show details of renumbering prior to grouping, while it is doubtful whether part of the information given above was available in any connection other than as a result of official investigation. The explanation now given, however, connects up Mr. Dunbar's contention as to the numbers being 703 and 705 with the renumbering of 1704 and 1706.

L.N.E.R. Improvement Schemes.

THE L.N.E.R. have decided to carry out a large number of works schemes under the Development (Loans, Guarantees and Grants) Act, 1929. The following are particulars of extensive projects, which together total to the sum of £1,700,000:—Stratford (Temple Mills), new sidings; Hornsey (Ferme Park), new sidings; Bishops Stortford, new sidings; Woodford and Hinton, new sidings; March (Whitemoor), additional sidings for down traffic and improvements to engine depot; Mexborough, loop lines and footbridge; Grimsby, docks improvements; Frodingham, new locomotive depot; Hull, sidings, storage ground and docks improvements; Manchester (Ashburys), new goods depot; York (Northallerton), widening from Skelton Bridge to Beningborough (quadruple), Alne to Pilmoor (triple), Otterington to Northallerton (quadruple), colour light signalling throughout the whole section of 26 miles between Skelton Bridge and Northallerton, and other signalling improvements; Bo'ness, sleeper depot; Thornton Junction, new locomotive depot; Inverkeilor, widening of the Inverkeilor—Usan and Montrose North—Hillside section to enable improvements in the working of express passenger, meat, fish and goods trains to be effected.

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The L.N.E.R. already have in hand the following schemes, under the remission of passenger duty proposals, on which work is at present in progress:—Romford, reconstruction of station and doubling of line two miles in length ; Hartlepool, additional sidings for coal traffic and the rearrangement of working facilities ; Doncaster, remodelling of the layout of the down mineral empties yard ; Grimsby (Royal Dock), installation of electric cranes and construction of upper storey to the transit sheds on the east side ; Doncaster and Spalding, new independent lines between London and Doncaster *via* March and Spalding ; and Hull and Grimsby Docks, adaptation of coal-shipping appliances for dealing with 20-ton wagons.

L.N.E.R. Traffic Observations.

A NUMBER of readers have sent notes as to their observations of International Association and Cup Final football specials, but space will not permit of detailed consideration beyond the following notes, with other comments, sent by Mr. R. A. H. Weight:—

The International Association match attracted a remarkable number of Scottish visitors to London and Wembley on April 5, the eight special trains from beyond the Border being augmented by a number of day excursions, which were run into King's Cross from the North Eastern and Midland county areas on the same day. No less than eight Newcastle "Pacific" engines (six Gateshead and two Heaton Shed) worked to King's Cross on these excursions ; one Edinburgh 4-6-2 also coming through. All the heavy Scottish return specials were booked to be worked throughout to Edinburgh by the same "Pacific," loads behind the tender in the case of five of these being from 470 to 530 tons. A careful count revealed the interesting fact that in the twenty-four hours which constituted Saturday, April 5, a new record had been created in respect to the number of different "Pacific" engines which worked in and out of King's Cross on the one day, viz., 33! This total included one Raven 4-6-2—No. 2401, *City of Kingston-upon-Hull*—which worked up on the "Flying Scotsman" that evening. She also visited London upon the night Gateshead turn on April 10.

The Easter period produced very heavy long-distance traffic, some fifty-five additional express and main-line trains being recorded in and out of King's Cross on Thursday, April 17; the proportion of down or outward specials being considerably greater than those on the up or inward side, as is customary on such occasions. The only notably unusual engine on this great day was Doncaster 3-cyl. 2-6-0 4004, which worked to London with Scotch corridor stock on the Wednesday night and returned on the first part of the 11.30 a.m. King's Cross to York on the Thursday. Owing to the inclement weather only one train was required for the Skegness half-day excursion on Bank Holiday—a most unusual and depressing feature!

New Gresley "Super-Pacifics"—2596 *Manna*, and 2597 *Gainsborough*—have commenced working on the Edinburgh-London turns from Gateshead Shed, and by the time these notes appear in print no doubt most of the others reported as building in the May number will be completed. A batch of "J50" 0-6-0T, of the "Ardsley" shunting type, numbered 2789-94, is also being turned out simultaneously from Doncaster works, these engines sharing works numbers from 1731 onwards with the "Pacifics."

The 7.30 p.m. Aberdonian and Highland express from King's Cross is again loading to prodigious totals. On two evenings consecutively after Easter the famous standard "Pacific" 4474 *Victor Wild* passed Wood Green at the usual time, making very little noise, hauling 536 tons tare, or probably 565 tons gross load! Driver, F. Norman, King's Cross.

For the Cup Final on April 26, twenty-four special trains ran in and out of King's Cross ; some of them actually arrived well before scheduled time, whilst the running generally was particularly good. The rolling-stock employed consisted of the usual variety of vehicles from dining and vestibuled cars to the old-style six-wheeled saloons, which latter seem very popular with the small parties which form such a large proportion of the traffic of the industrial districts of the North. Engines included:—N.E. area.—Gresley Pacifics, two "Shires," 3-cyl. Atlantics. G.C.—4-cyl. and 2-cyl. (mixed traffic) 4-6-0, 4-4-0 Director type. G.N.—Doncaster Pacifics, Doncaster 3-cyl. 2-6-0, Colwick 2-cyl. 2-6-0 engines ; and one or two Atlantics.

Long-distance specials hauled by various locomotives, principally G.C. types ; and, of course, the local intensive Stadium special service, made the Marylebone-Neasden lines especially busy on this date.

The Aylesbury and Brill Tramroad.

COMMENTING upon previous references in various issues of THE RAILWAY MAGAZINE, Mr. L. Catchpole sends a photograph of an engine, *Alan Lambert*, belonging to the

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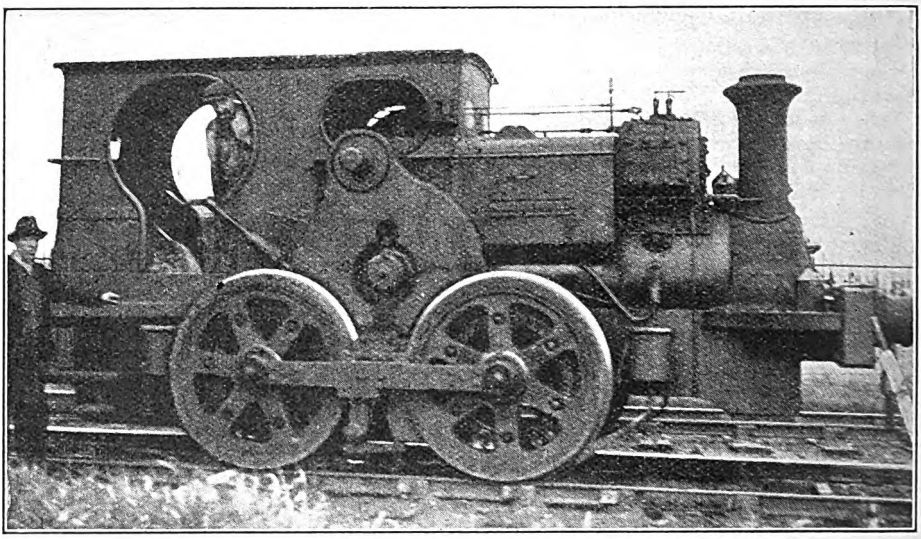
Croydon Gas Company, and to be seen in their yard near West Croydon, which he suggests might bear a closer resemblance to those of the Brill line than the adapted traction engine to be seen working in Messrs. Hall & Company's yard at East Croydon. As a matter of interest, this photograph is reproduced. Mr. Catchpole suggests that it was built by Messrs. Aveling & Porter, of Rochester, about 20 years ago, and that it has the characteristics of a traction engine, although the chimney and cab are more or less conventional.

Irish Locomotive Notes.

MR. K. DAVISON sends particulars of specials on St. Patrick's Day (March 17) as follows:—Waterford special, 4-4-0, No. 336, 3 corridor "bogie" thirds, 1 bogie third, 1 small first and third and 1 small van. Approximate tare, 135 tons. Limerick special, 4-4-0, No. 310, 4 corridor "bogie" thirds, 1 small third and 1 small van. Tare, 145 tons. Cork special, 4-6-0, No. 502. 8 "bogie" thirds, 1 large van and 1 small van, vestibuled corridor throughout. Tare, 286½ tons; increased to 347 tons on the return journey. It is understood that no further locomotives of the "850" (2-6-2T) class are to be constructed at present, and that no more of the "372" (Woolwich 2-6-0) class are to be constructed by the G.S. Railways, the six sets of parts remaining having been sold or otherwise disposed of.

The Four 9.35's.

MR. W. H. HARE-TAYLOR points out that at 9.45 p.m. Edinburgh provides an alternative solution to Mr. L. C. King-Wilkinson's puzzle query in the April number, and which received attention in a "Pertinent Paragraph" under the heading "The Four 8.5's in the May number. Thus three trains leave Waverley station—one for Corstorphine, one for North Berwick (not Saturdays), and a circle train on the Suburban line, while at the same time Prince's Street station sends out its own 9.45 p.m. for Stirling *via* Polmont and Falkirk. With regard to Southport, we note that the March, 1930, timetables show the departure as 8.4 a.m.



TRACTION ENGINE LOCOMOTIVE AS USED ON THE BRILL LINE.

Public Excursion to Eastleigh Works, S.R.

ON Tuesday, April 29, the Southern Railway ran a special express dining-car excursion at a low fare between Waterloo and Eastleigh conveying members of the general public to view the locomotive, carriage and wagon building and repairing works at Eastleigh. This was the first occasion on which an excursion of this character had been arranged by the Southern Railway, although similar trips have been run by the G.W.R. to Swindon works since the end of 1927. The handbills advertising the trip invited passengers to participate in a conducted tour of the works in which the "Lord Nelson," "King Arthur," and "Schools" class locomotives had been constructed.

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The Eastleigh works cover an area of about 88 acres. The total number of men employed at the present time is over 3,000, and the works repair per annum about 530 locomotives, 2,580 carriages and 7,000 wagons, while, in addition, 20 new locomotives and 200 corridor carriages are built each year.

The train, which left Waterloo at 11.20 a.m., was hauled by "Lord Nelson" class four-cylinder locomotive No. E865, *Sir John Hawkins*.

On arrival at Eastleigh the party was divided into two for visiting the locomotive shops and the carriage shops, in turn. They were received by Mr. F. Munn, Assistant Manager, Locomotive, Carriage and Wagon Works, and Mr. S. Hatchell, Assistant to Works Manager for Locomotive Works. In small groups the visitors were escorted over the various shops by guides, and the large number of questions asked was alone convincing evidence of the great interest shown by all. Outside the erecting shop, the latest three-cylinder "Schools" class locomotive, No. E903, *Charterhouse*, and one of the "King Arthur" class 4-6-0's, No. E789, *Sir Guy*, were drawn up for inspection, specially erected wood staging enabling those interested to examine the footplates. The return to Waterloo was made at 4.50 p.m., the train being again hauled by "Lord Nelson" class engine, No. E865.

The Development of the Chalk Advertisement.

We have on several occasions referred to examples of clever chalk work carried out by members of the staffs of various railway stations, some of them indicating very decided talent, both in regard to execution and in respect of ideas and realisation of the possibilities which this medium offers. In a recent issue of the *Yorkshire Evening Post* a "gossip" column included some interesting remarks on chalk notices carried out by Excessman J. Swann, of the joint staff of Leeds (New) station, showing that work of this kind not only realises its object —that of attracting attention—but is regarded as worthy of special commendatory notice by a representative of a leading local publication. The notice in question was headed "That He Who Runs May Read," and was as follows:—"It is to be hoped that, despite the general teaching of script writing and the laments which burst forth every now and then about the inability of the uprising generation to write legibly, there are, hidden away in the obscurity of some of our schools, a few boys with the mastery of the true, old copper-plate style of hand-writing. Otherwise, I fear, future generations will never know one of the pleasant little sights of to-day—the excursion notices written in chalk on railway station notice-boards. Where the artists who so neatly write these notices are trained I do not know, but they belong to a race apart. Many a school-teacher might envy their skill in writing with chalk. Surely, it is worth an effort to prevent theirs becoming a lost art? Will the day dawn when people will study in a museum a fragment of writing about a football special from Leeds to Huddersfield, and speak of the great days of the early twentieth century when men could do that beautiful lettering? Let us hope the railways will encourage the continuance of the craft spirit which lavishes time and care on work which, the workman knows, must soon be swept away to make room for something else. It is all too rare."

Mr. E. M. Sanders Train Service Puzzle.

This query arose out of a study which showed that, to reach Keswick, from Euston, except during the summer months, when the "Lakes Express" is running, the journey can be made more quickly by using "The Royal Scot" express to Carlisle and continuing in a through carriage hence to Keswick (8 hrs. 8 min.), than by the 10.35 a.m. ex Euston (8 hrs. 36 min.), although the 1.30 p.m. from Euston gives the best service of the day (7 hrs. 37 min.), at the expense of a late evening arrival. This led to the study which prompted the query, that Whitehaven can be more quickly reached from Euston *via* Carlisle (winter months) than *via* Carnforth and Barrow. Using the 10 a.m. ex Euston, and the 4.12 p.m. from Carlisle, the journey is, in fact, completed more quickly than by any of the three through Euston-Whitehaven services *via* Barrow.

Mr. F. J. Wright's Puzzle Query.

The two towns in question are Bournemouth and York. One train leaves Bournemouth West at 11.5 a.m., and travels via Basingstoke, Oxford and the L.N.E.R. route, reaching York at 7.27 p.m. The other train leaves Bournemouth West at 11.35, and travels via Bath and the L.M.S.R., joining the other route just beyond Rotherham, and reaching York at 7.45. In the opposite direction the L.N.E.R. train leaves York at 10 a.m., arriving Bournemouth West at 6.31 p.m., while the L.M.S.R. train leaves York at 10.10 a.m., arriving Bournemouth West at 7.12 p.m.

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Mr. L. G. King-Wilkinson's Remarks.

COMMENTING on these puzzle queries, Mr. L. C. King-Wilkinson writes:—

Mr. E. M. Sanders in his query is, I presume, referring to Whitehaven, which is the terminus of winter through carriage services leaving Euston at 6.45 a.m., 10.35 a.m., and 1.30 p.m., but which can be reached in the minimum time from London by the winter 10.0 a.m. from Euston connecting with the 4.12 p.m. ex Carlisle. Last summer the 11.35 a.m. ex Euston beat the best winter time of 8 hours 3 minutes by doing the journey in the even 8 hours. This could, however, still be bettered by two minutes by travelling on the 10.5 a.m. ex Euston *via* Carlisle and arriving Whitehaven at 6.3 p.m. I think the through services in each direction between York and Bournemouth West, leaving the former place at 10.0 a.m. (L.N.E.) and 10.10 a.m. (L.M.S.) and the latter at 10.55 a.m. (L.N.E.) and 11.35 a.m. (L.M.S.), or as an alternative the L.M.S. service at 9.30 p.m. and the L.N.E. service at 10.13 p.m. from York to Bristol, supply the answer to Mr. P. J. R. Wright's query. The L.M.S. and G.W. competing routes between Manchester (London Road) and Bournemouth West and the L.M.S. and "Waverley" routes between Carlisle and Aberdeen also appear to fulfil the necessary conditions of the question except in so far as the distance covered "in common" is concerned. The Manchester-Bournemouth routes have only 30 miles in common between Manchester and Crewe, while the Carlisle-Aberdeen routes have only some 20 miles "common" from Aberdeen to Kinnaber Junction.

The answer to Mr. C. Taylor's query is, I think, to be found on the Woodford-Ilford line of the old G.E.R. or on the old L.S.W.R. Woking-Ascot and Weybridge-Virginia Water lines. In particular the 5.4 p.m. (Saturdays excepted) from Waterloo appears to make a round trip *via* Weybridge and Virginia Water, as does the 7.40 p.m. (Sundays) out of Waterloo *via* Woking and Ascot. Or are these "circle" or "semi-circle" services?

The Transport Observation and Model Society.

THIS Society held its fourth annual dinner on Saturday, May 3, under the chairmanship of Mr. J. F. Gairns, Vice-President, Editor of THE RAILWAY MAGAZINE. The gathering was not a large one, but the proceedings as a whole indicated that the Society is making steady progress and that, having completed more than four years' active operation, it has now taken a definite place among societies of its kind. Its meetings are held regularly in London, while the *Transport Observer*, the official publication of the Society, is now widely appreciated by members and by a number of outside readers. Mr. W. Hann, President, was not able to occupy the chair owing to indisposition, but was present to support the chairman, while Mr. Percival Marshall, editor of the *Model Engineer*, was a welcome guest. Following the loyal toast, Mr. R. J. Westby proposed the health of the Society, referring to the improved accommodation of the new headquarters at the Adelphi Hotel, looking back with pleasure to the "Transport" nights of the past session, and Mr. S. M. W. Hann, hon. secretary, responded, giving some particulars of the Society's development. Mr. C. Baker proposed the toast of "Our Guests," to which Mr. Percival Marshall replied in an entertaining speech, while Mr. J. F. Wood proposed the toast of "The Chairman." In the speeches acknowledgment of the valuable assistance rendered by various officers of the Society and by the Committee was expressed, while later in the proceedings Mr. Hann, the President, made a few remarks. Musical and humorous items were contributed during the evening by Miss Eleanor King, Messrs. P. G. Fraser and A. Jaggard (entertainers), and Mr. J. F. Wood (diseur), Mr. James Hunter being at the piano, and a most enjoyable evening resulted. Mr. S. M. W. Hann, Hon. Secretary, of "Frensham," 7, Shirley Road, Croydon, Surrey, will be pleased to send particulars of the Society and its activities and of the *Transport Observer*. Railway visits arranged are: June 4, Camden Loco. Shed, and June 18, Kentish Town Loco. Shed, L.M.S.R.

The Model Railway Club Exhibition.

THIS year's exhibition, which was held at the Kingsway Hall, W.C.1, from April 22 to 26, showed a wide range of subjects. The popularity of the "0" gauge, so clearly marked in the last exhibition, was further demonstrated by the large number of entries this year, although plenty of support was forthcoming for the other gauges, ranging from the diminutive "00" up to the "9-in." Another marked feature was the growing number of steam models in "0" gauge in the locomotive section. The usual locomotive favourites were well represented by G.W.R. "Kings" and "Castles," L.N.E.R. "Pacifics," L.M.S.R. "Royal Scots" and compounds, and re-

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presentative Southern classes, one of these last being an L.B.S.C. Billinton 4-4-0 finished in the late Mr. Stroudley's famous "improved engine green," otherwise yellow. In addition, several electric locomotives were shown, the most popular prototype for these appearing to be Sir Vincent Raven's 4-6-4, No. 13, constructed for the North Eastern. There were also an American Mallet articulated engine, a German standard tank, complete with detail pipework, Knorr feed-water heater, air pump, &c., and further variety was given by a Cape Government Railways, now South African Government Railways, heavy goods engine, and, on the historical side, by a model of Richard Trevithick's early locomotive constructed as nearly like the original as existing evidence will allow. There were free-lance locomotive models of various types and gauges, among them being a very fine set of frames, cylinders and wheels for a 4-8-4 tank design, and a model of the popular 4-6-2 "Helen" design with Baker valve gear.

The rolling-stock section, as usual, represented practically every type of vehicle, from the completely fitted up model restaurant car in gauge "0" and the sleeping car to the refrigerated meat van and the container truck complete with removable containers. There were sets of L.N.E.R. triplet articulated cars and a "Flying Scotsman," an L.M.S.R. "Night Scot" and stock for the G.W.R. "Cornish Riviera," &c., a set of former G.C.R. four-wheeled coaches and a Lits Salon, this exhibit being the work of a French model enthusiast, on the passenger side. The sets of G.W.R. rolling stock shown last year were again included, together with samples of further types, all of which showed the same painstaking attention to detail and finish as was associated with the earlier models by the same builders. The goods department was represented by practically all types, and a train-load of "W.D." guns and limbers was included. Among the definite departures from standard subjects were the very realistic model G.W.R. breakdown crane, capable of reproducing every movement of its prototype, and a model double-ended Southern Railway snow plough.

A feature which attracted considerable attention was a complete model "00" gauge railway and dock, operated electrically and noteworthy for the large amount of detail included. The locomotives here used were mainly of former North Eastern designs, but an L.N.E.R. standard "J39" 0-6-0 was included together with an L.M.S.R. "Royal Scot." The signalling section contained a very fine set of points and crossings, with signals complete, the whole interlocked as in actual practice. There were also a number of working colour-light signals, including one very realistic model of a Southern Railway overhead electric gantry with sets of colour-light signals in cluster formation. A particularly noteworthy model was that of a complete mechanical coaling plant and turntable constructed on the "0" gauge, with electrical control.

In the hall below the main exhibition, the Model Railway Club's track was set up and many different types of locomotives, steam, clockwork and electric, were tried out during the exhibition, visitors being invited to bring their own locomotives to be tested. The passenger-carrying track, kindly loaned by the Society of Model and Experimental Engineers, was again a popular feature in the main hall, the locomotives used including the veteran 4-6-0 *Cosmo Bonsor*, the 4-8-0 *Felix Pole*, the Tilbury 4-4-2 tank, and others. The following specialists in the model-making world were among those represented in the trade section:—W. J. Bassett-Lowke, Walkers (Baker Street) Limited, the Windsor Model Company, Buck & Ryan, Bonds of Euston Road, R. F. Stedman and Percival Marshall & Co. Ltd., &c. The secretary of the Model Railway Club is Mr. J. C. Watts, and his address is "Haddington," Wood Vale, London, N.10.

Mr. C. Taylor's Train Service Query.

THE solution to this query, which asked on what steam train starting from London was it possible to make a journey in the up direction (excluding circle and semi-circle services), is the 4.45 p.m. from Liverpool Street, which, travelling *via* Cambridge and Bury St. Edmunds to Haughley, continues to Ipswich as an up train. The return working involves even more extensive running as a down train before becoming an up train, in that the train then starts from Colchester at 7.30 a.m., taking the same route.

The Oxford and Aylesbury Tramroad.

MR. W. E. EDWARDS writes:—"The traction engine noted by Mr. W. Goodyear would, no doubt, be one of the original locomotives as first employed upon the line. Their place was taken by two ordinary locomotives named *Wotton* and *Brill*. The latter continued at work until comparatively recent times. The name is preserved in the case of a later type Metropolitan engine to-day."

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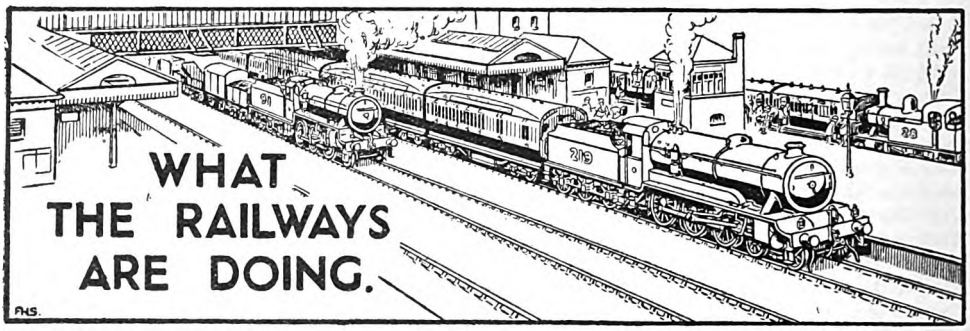

Mr. Walter Alexander Ree, who was unfortunately compelled by ill-health to retire from the position of Chief Stores Superintendent, L.M.S. Railway, on March 31, was educated at Rossall, and entered the service of the L.N.W.R. in 1892, in the Goods Department at Waterloo station, Liverpool. In 1903 he became Assistant Superintendent of the Manchester District, and in 1906 was selected as District Traffic Superintendent of the Central Wales section, subsequently serving as District Goods Manager in South Staffordshire and later as Outdoor Goods Manager, Southern Division, in succession to Sir Herbert (then Mr. H. A.) Walker. The Southern Division Outdoor Goods Manager's office at that time was removed from London to Birmingham. In 1912, Mr. Ree went to Exchange station, Manchester, as Outdoor Goods Manager for the Northern Division, but returned to the Southern Division in the following year. In March, 1920, on the retirement of Mr. Chipman, he took over the whole of the system as Outdoor Goods Manager, becoming Southern Divisional Goods Manager after the amalgamation of the L. & N.W. and L. & Y. Companies in 1922. On the formation of the L.M.S.R. Mr. Ree continued in the same capacity until appointed Goods Operating Manager for the entire system in 1924, becoming Chief Stores Superintendent in November, 1927.

* * *

We regret to record the death, at his home at Beverley, on April 22, of Mr. J. A. Wickham, C.B.E., M.Inst.C.E., M.I.Mech.E., Chief Engineer for Docks, London & North Eastern Railway, to which position he was appointed on January 1, 1928, on the retirement of Sir John Nicholson. Mr. Wickham previously held the position of Assistant General Manager (Parliamentary), and also covered the duties of Industrial Agent, from 1925. Mr. Wickham joined the London & North Eastern Railway Company in June, 1924, as Assistant to the Chief General Manager, King's Cross. He was only 48 years old.

To mark the retirement of Mr. C. W. L. Glaze from the position of Mechanical Engineer, Stratford, he was entertained to dinner at the Liverpool Street Hotel on March 19, those present including Messrs. H. N. Gresley, O. Bulleid, R. A. Copperthwaite, S. Groom, T. E. Heywood, W. G. P. Maclure, H. W. H. Richards, J. H. Smeddle, A. C. Stamer, R. A. Thom, and E. Thompson. The gift of a gold cigarette case, suitably inscribed, was presented by Mr. Gresley.

* * *

On April 1 the officers at Liverpool Street station presented Mr. Glaze with a combination arm-chair and reading desk. There was a good gathering of the officers present, on behalf of whom Mr. G. F. Thurston, Divisional General Manager, made the formal presentation.

* * *

On April 4 a smoking concert took place in the Liverpool Street Hotel, when some 200 members of his staff and a few other friends foregathered for the purpose of presenting to Mr. Glaze a gold wrist watch, album of autographs with an illuminated address, and a silver rose bowl for Mrs. Glaze. Mr. E. Thompson, who succeeds Mr. Glaze, presided over the gathering, and the presentation of the gifts was made by Mr. H. N. Gresley, who paid high testimony to the value of Mr. Glaze's services to him ever since the formation of the London & North Eastern Railway. He spoke most feelingly when he thanked Mr. Glaze and those associated with him for what Stratford had done, and expressed the sincere hope that Mr. Glaze would live for many years to enjoy his retirement. The toast of "The London & North Eastern Railway Company" was proposed by Mr. D. Sayer and responded to by Mr. F. V. Russell; that of "Our Guest" was proposed by Mr. H. N. Gresley, with supporting speeches by Messrs. A. P. Parker, T. O. Mein, W. Sime, and A. W. Headley. The toast of "Our Chairman" was proposed by Mr. J. I. Hill. Mr. Glaze, in thanking the subscribers for

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their gifts, made appreciative reference to all who had been associated with him and helped to carry out his duties. The general arrangements were made by a committee, of whom Mr. E. Thompson was chairman and Mr. A. W. Headley secretary.

* * *

MR. H. W. C. DRURY, who has been appointed District Superintendent, Stratford, L.N.E.R., in succession to the late Mr. F. G. Randall, has held the position of District Superintendent at Norwich since July, 1916. He entered Great Eastern Railway service in 1896, in the Works Manager's office at Stratford, remaining there until 1899, when he was transferred to the Locomotive Running Department. In 1901 he was appointed Assistant District Locomotive Superintendent at Norwich, remaining there until 1903, when he was appointed District Locomotive Superintendent at Doncaster. He stayed in that position until the end of 1912, when he was transferred to Cambridge in a similar capacity. In July, 1914, he was transferred to Norwich as District Locomotive Superintendent, holding that position until, in July, 1916, he was transferred to the Operating Department and appointed District Superintendent at Norwich, as above indicated.

* * *

MR. F. C. WILSON, who has been appointed District Superintendent at Norwich, L.N.E.R., in succession to Mr. H. W. C. Drury, transferred to Stratford, has held the position of Stationmaster at Liverpool Street since November, 1927. He entered Great Eastern Railway service as a junior clerk at Saffron Walden, and after various clerical appointments at Newport (Essex), Clare, Hunstanton and Haverhill, was, in 1905, specially selected to represent the Great Eastern Railway as Passenger Agent at York. In that position he obtained a comprehensive experience of railway operation in many phases. In 1910 he was appointed Stationmaster at County School, transferring a year later to Shippea Hill. In 1913 he was appointed Stationmaster at Chadwell Heath, and in November, 1915, was appointed Assistant Stationmaster at Liverpool Street, with charge of the Locomotive Running there. In February, 1923, he was appointed Stationmaster at Norwich (Thorpe), with charge of passenger and goods train working, also Crown Point Marshalling Yard, Trowse and Norwich (Victoria). In November, 1927, he returned to Liverpool Street as Stationmaster, as above indicated.

* * *

WE regret to record the death of Mr. M. S. Strang, M.B.E., Passenger Manager, Southern Scottish Area, L.N.E.R. Mr. Strang became Commercial Superintendent of the North British Railway in 1918 in succession to Mr. William Strang, and was promoted to the position of Area Passenger Manager, L.N.E.R., in 1923.

* * *

MR. C. R. WEBB, O.B.E., M.C., General Manager of the Sierra Leone Government Railways since June, 1923, and before that, Traffic Manager of the Tanganyika Railways, has been appointed to the position of General Manager of the Palestine Railways, in succession to Colonel Holmes, O.B.E.

* * *

ONE of the most interesting and, at the same time, amusing posters to be seen just now on the station walls of the "Underground" is that labelled "The Sights of London." It is of the "map" order, and is nicely coloured, the bright blue of the winding Thames and the spring green of the various parks and open spaces being in pleasing contrast to the more sober hues employed in the delineation of the network of streets and houses. Our old friends Gog and Magog figure prominently in the right and left bottom corners of the bill. With Piccadilly as the hub, the section of the Metropolis covered by Mr. John Dixon, the artist, stretches from Tower Bridge in the east to Kensington Gardens in the west, and from Mornington Crescent in the north to Vauxhall Bridge and the Oval in the south—a pretty wide area. Railway stations are plainly indicated by means of a red-rimmed white disc about the size of a shilling, and it is surprising how many stations there seem to be in the particular area dealt with. Much fanciful treatment has been employed in regard to the public buildings and other "sights" of London, and where characters and figures are introduced, history and literature have been drawn upon with telling effect. Wat Tyler, for example, is shown in the vicinity of Aldersgate; the Canterbury Pilgrims are riding through the Borough; near Baker Street, Sherlock Holmes is making sapient remarks to Dr. Watson; whilst farther afield, Dombey and Son are footing it towards Torrington Square. Among other felicitous touches may be mentioned the pelicans by the lake in St. James's Park, a sportive mermaid in the river off Temple Pier, an old-time hansom cab plying outside Euston station, and a toy train crossing Hungerford Bridge. In whichever direction one looks the poster teems with quiet fun and happy thought.

* * *

A NEW picture poster designed to advertise the advantages offered by the "Under-

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MR. L. W. JUDD, M.B.E.,
Appointed Indoor Assistant to Traffic Manager, Southern Railway.

MR. G. H. HARE-DEAN,
Appointed Assistant for Statistics and Special Work to Traffic Manager, Southern Railway.

MR. E. ARKELL,
Appointed Assistant for Statistics and Special Work to Traffic Manager, Southern Railway.

MR. S. J. ROBERTS,
Appointed Staff Assistant to Traffic Manager, Southern Railway.

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ground" in the matter of cheap fares for school picnics is likely to prove very popular, seeing that it is simple in design and colouring and has a distinctly humorous touch. Its chief feature shows a blackboard, on which is the outline of a figure typifying care-free, capering boyhood—roughly but effectively drawn, in juvenile fashion, in chalk. The letterpress intimates that an illustrated booklet containing full particulars is obtainable on application to the Commercial Manager, 55, Broadway, Westminster, S.W.

* * *

THE picturesque "front" of Hastings and St. Leonards is faithfully depicted in a large and gaily-coloured poster just issued by the Southern Railway. The view is taken from the cliff-top east of the old Castle, and beyond the fine sweep of the singularly blue sea the distant promontory known as Beachy Head stands out boldly against the sky-line. In the foreground is a group of holiday-makers looking down upon the fishermen's quarters far below them. Altogether, a very attractive production. Other and smaller posters include one relating to cheap fares—a simple study, in red and black on white, of a Southern Railway official distributing day, half-day, and week-end tickets; a cliff view background—it might be Broadstairs—on which is superimposed a bold letterpress announcement advertising S.R. guide-books; and a third showing a typical French group quaffing Gravés at an open-air restaurant, designed to call attention to the S.R. excursions to the Continent and the Channel Isles.

* * *

MEMBERS of the Railway Club spent an interesting evening at their headquarters on April 7, when Mr. D. S. Barrie read his paper entitled "Railway Rambles with a Camera." The greater part of the paper dealt with the lesser known railways in the county of Cumberland, namely, the now derelict Solway Junction Railway, the Cockermouth, Keswick & Penrith, and the Ravenglass & Eskdale, and the lecturer showed how their inception was due to the demand for the hematite iron ore of West Cumberland, and for more direct means of communication with Lanarkshire and the North-East Coast of England, and how the closing down of the Solway Junction Railway resulted from the decline in this industry. A full description was also given of the Brampton Railway, now also out of use. The lecture was illustrated by lantern slides from photos taken by the author, some of which were of exceptional merit. On May 5 Mr. J. D. Goffey read a paper on the Robinson locomotives of the Great Central Railway.

* * *

CHEAP day trips at single fare for the double journey will continue to be available every week-day (except Saturday) during the coming summer, from London and some 200 Southern Railway suburban stations to the principal seaside resorts in Kent, Sussex, Hampshire, and the Isle of Wight. In the reverse direction similar cheap tickets will be issued from these resorts on the South Coast for day trips to London. Additional stations, including Lewes, Ashford, Tunbridge Wells, Tonbridge, Sittingbourne, Faversham, Queenborough, and Havant, are now included in the scheme.

* * *

WARWICK Cape Yard Goods Depôt is to be extended by the G.W.R. to deal with the special traffic arriving for the Royal Show, which will be held in the Castle Park at Warwick next year.

* * *

AN accelerated service from the Channel Islands is now afforded by the G.W.R., the journey time between Jersey and London and other towns in the country being reduced by one hour. Steamers leave Jersey at 8.30 a.m. and Guernsey at 10.30 a.m. on Tuesdays, Thursdays, and Saturdays, instead of at 7.30 a.m. and 10 a.m. respectively.

* * *

THE Southern Railway is making special arrangements for the conveyance of motor-cars across the Channel this summer, and considerable reductions will be made in the rates as from May 1, the charges in some cases being cut by over 25 per cent. During the winter months October to April a further reduction of as much as 20 per cent. is being made in some of the rates. A special service of fast cargo steamers will be in operation every day between Folkestone and Boulogne, Dover and Calais, and Newhaven and Dieppe (except Sundays).

* * *

MR. R. BELL, C.B.E., Assistant General Manager, L.N.E.R., delivered a lecture on "Transport Developments in 1929" at a meeting of the Graduates and Students of the Institute of Transport on April 15.

* * *

THE annual Association football match between the Railways Athletic Association team and a selected team from the Nord Railway employees, was played at Compiegne on April 20, and resulted in a victory for the French team by 4 goals to 3, the French thereby becoming holders of the "Pape" Challenge Cup, which was

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MR. H. COOK,
Appointed New Works Assistant to Traffic Manager, Southern Railway.

MR. R. BUXTON,
Appointed Assistant for Road Transport to Traffic Manager Southern Railway.

MR. A. H. LINGARD,
Appointed Deputy Commercial Assistant to Traffic Manager, Southern Railway.

MR. W. M. PERTS,
Appointed Assistant for Rates and Fares to Traffic Manager, Southern Railway.

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presented for this event by Mr. G. Pape, of the Southern Railway. The match was attended by M. Dautry, Director General of the French State Railways; M. Flamand, Chief Engineer of the Nord Railway; M. Dessantcourt, the Mayor of Compiegne, and a number of other prominent French railway officials. The English team and officials were heartily welcomed during their stay in France.

* * *

MR. L. C. KING-WILKINSON sets another train service problem:—Travelling between what two large towns, 24¾ miles apart by the shortest route, and having each only one station, and leaving at what time is it possible, daily except Saturday and Sunday, to take one's choice of two trains leaving opposite ends of the departure station simultaneously, and, travelling by totally different routes, arriving at one's destination, at opposite ends of the station, within two minutes of each other; one service the longer in both distance and time —being "through"—and the other necessitating one change of trains but not of stations and a wait of exactly five minutes at a large town which has two stations, just under half-way? On arrival at one's destination the two trains remain for several minutes, and then proceed to their respective ultimate destinations, again within two minutes of each other.

* * *

MR. MARK G. COWLISHAW writes supporting Mr. A. Ransom Cowlishaw's remarks as to noting a Somerset and Dorset six-wheeled coach between Croydon and London, Southern Railway. He also was surprised to see it in this location, further remarking upon the coincidence that similar observations should be made by two correspondents, presumably unrelated, who share the same rather uncommon surname.

* * *

A CORRESPONDENT (BM/RRR) and other readers confirm the observations of Mr. A. R. Cowlishaw as to seeing an S.D.J.R. six-wheeled vehicle at Clapham Junction and Vauxhall, suggesting that it now works to London more or less regularly. Mr. Savage adds No. E331 to the list of 4-6-0's now fitted with smoke deflectors. He also mentions having noted a complete train of old L.S.W.R. vehicles in the old L.S.W.R. livery working empty in charge of a B section 0-6-0. BM/RRR adds that a set of G.W.R. milk vans usually passes through Surbiton about 9 p.m.

* * *

IN view of recent references to roundabout loop trains, Mr. F. Ward points out that there are two L.M.S.R. routes in the Birmingham area, Midland section: New Street to King's Heath and via Lifford Curve to the West Suburban line back to New Street (North Western section), and New Street to Soho Road, Handsworth Wood and Aston back to New Street, worked by six and nine trains daily, respectively, though in the latter case some stop short at Aston.

* * *

THE summer season of the Stephenson Locomotive Society was commenced with an outing to Nine Elms Locomotive Sheds on Saturday, March 22, in glorious weather, a large attendance being recorded, as was also the case in the subsequent visit to King's Cross on April 5. The Lancashire and Scottish Branches also made a good start, and a particularly noteworthy attendance was noted at the visit to Crewe Works on April 12. At the last meeting of the winter season, Mr. W. A. Willox was extremely entertaining in a paper on the German railways, illustrated with numerous of his own slides.

* * *

THE return Rugby football match between teams representing the British railways and French railways was played on the Leicester F.C. ground at Leicester on April 19, and resulted in a draw, both sides scoring five points. Before the match both teams were lined up on the ground and were welcomed by Mr. J. H. Follows, C.B.E., M.V.O. (Vice-President, L.M.S.R.), who was supported by Messrs. W. Geo. Pape, O.B.E. (S.R.), and F. E. Baxandall (L.M.S.R.), also by M. Verlot (P.O. and Midi Railways) and M. Jardin (l'Etat Railway).

* * *

MR. J. R. HOLLICK mentions that upper-quadrant signals are being fitted between Ambergate and Derby, L.M.S.R., while he comments upon the very punctual working which, so far as it has come under his notice, is now secured at Stoke-on-Trent, notwithstanding the congested traffic in that district. New "Class 2" 4-4-0 compounds and 2-6-4T's are used in the Potteries, though many of the N.S.R. locomotives are still to be seen.

* * *

COMMENTING upon a recent paragraph under the title of "L.M.S.R. Ramifications in Lancashire," and, in particular, the working of passenger services over the Whelley loop near Wigan, Mr. C. Taylor asks, in view of the statement that two passenger trains use this route during the day, one being the 5.5 p.m. (Saturdays excepted) Windermere club train from Manchester,

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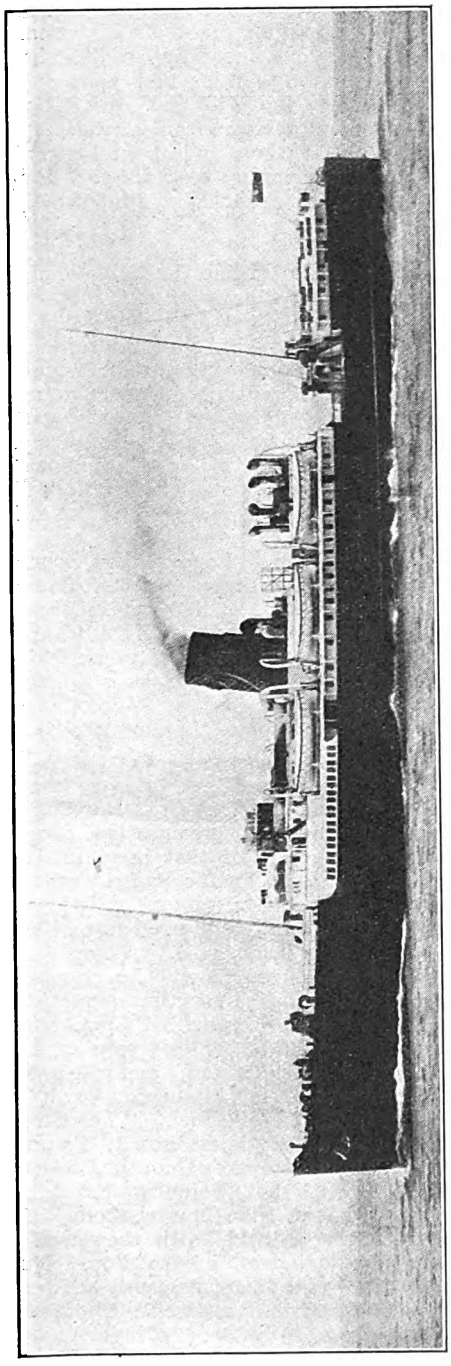

NEW G.W.R. TWIN-SCREW CROSS-CHANNEL STEAMER "ST. PATRICK."

for information as to the other passenger train concerned.

* * *

At the Van Horse Parade held at Regent's Park on Easter Monday, seven L.N.E.R. teams entered and all were awarded first prizes.

* * *

The Minister of Transport has recently made the undermentioned Order: The Southern Railway Order, 1930, authorising the construction of a railway and the acquisition compulsorily or by agreement of lands in the Rural District of Hoo in the County of Kent by the Southern Railway Company and matters incidental thereto.

* * *

Mr. F. Ward asks what labelled cross-country express calling at an industrial city, with two main-line stations, on week-days (Mondays and Saturdays excepted in the summer months), uses the same platform on both up and down journeys, though travelling east and west.

* * *

An order for a locomotive coaling plant at Parkhead, Glasgow, locomotive depot, has been placed by the L.N.E.R. with Henry Lees & Co., Glasgow.

* * *

Mr. R. Hardy writes:—"On Tuesday, April 22, No. E901 *Winchester* worked a long empty train from Clapham yard to Bournemouth. About 10 minutes after she went through Woking, No. E900 *Eton* appeared on the 1.20 p.m. Weymouth to London express. This was loaded to 13 bogie coaches (418 tons), a colossal load for a 4-4-0! *Eton* was doing well, and these engines certainly show signs of being a remarkable class. On the same day the 3 p.m. down West of England express was worked by No. E865 *Sir John Hawkins* piloting a small Drummond 4-4-0, an unusual combination, and the first time I have seen a 'Nelson' either piloting or being piloted on a train. The engines on this section are all very clean and bright, from the Drummond 0-4-4 tanks to the 'Nelsons.' The locomotives now carry the section letter on the buffer beam where the old number used to be. An interesting rebuild is No. E460, which has just appeared from the shops. This Drummond 4-6-0 has had the previous huge wheel splashers cut away, the frames have been made higher, and small splashers similar to the Nelsons fitted."

* * *

N.E. Section 4-6-2 No. 2401 *City of Kingston-upon-Hull* appears to have been working more or less frequently to King's Cross.

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MR. S. NEWMAN, of Rugby, mentions the following further S.R. 4-6-0's which have been fitted with smoke deflectors:—Nos. E331, E501 and E502. He also refers to new L.M.S.R. 2-6-2 tank engines noted at Derby, Nos. 15500-4.

* * *

MR. J. R. HOLLICK mentions having seen Johnson 4-4-0's (L.M.S.R. Nos. 306 and 311) at Derby in unrebuilt condition. He also refers to the new 2-6-2 tank engines, the first of which is illustrated as frontispiece, and to having noted that 2-4-0's Nos. 2 and 8 are at Derby, while Nos. 1 and 4 are also working in the district. Reference is also made to the fitting of Johnson 0-6-0T's in the "1600" series with Belpaire fireboxes.

* * *

MR. A. C. TODD, sending some notes as to new G.W.R. locomotives observed in traffic, including a number of the new 0-6-0's illustrated last month, mentions that the following new "King" class engines are approaching completion, and may be in traffic by the time these notes are published: Nos. 6020, *King Henry IV*; 6021, *King Richard II*; 6022, *King Edward III*; 6023, *King Edward II*; 6024, *King Edward I*; 6026, *King John*.

* * *

"CLAUD 8810" sends the following notes on locomotive observations in the West Riding:—"In consequence of the scrapping of G.N. 0-8-0's, these have been largely replaced by G.C. 0-8-0 engines, many painted in the latest style. An R.O.D. 2-8-0 No. 6287 has been rebuilt with a G.N. type boiler—*i.e.*, round-topped firebox, superheater and standard chimney as fitted to the "J39" 0-6-0 engines. In addition, a side-windowed cab has been provided. Two G.E. 0-6-0 tanks are at work in the Carriage Works at Doncaster—viz., Nos. 7266 and 7361—while 7033 and 7036, of the "J68" class, are at Ardsley. All the ten G.C. 4-6-0 engines of the "Immingham" class are permanently stationed at Leeds Copley Hill—*i.e.*, Nos. 6095-6104 inclusive. A new "twin" coach set has appeared in the district, being a rebuild of a steam autocar once used on the G.N. section with a 0-4-0T engine. Can any reader inform me of what happened to the 0-4-0T (No. 2)? (The two coaches were for a long time derelict outside the carriage works at Doncaster.)

* * *

"KING EDWARD VII" mentions that he noted G.W.R. 2-6-0 No. 6332 fitted with the Westinghouse brake pump on the driver's side and having a tender as now fitted to "Hall" class engines. No. 3816 *County of Leicester* was noted with the tender originally fitted to the *Great Bear*.

* * *

A SPECIAL express train is now running on the electrified line between Stockholm and Gothenburg. On its first journey the train covered the 458 km. in 5 hours 44 minutes, representing an average speed of about 80 km. (50 miles) an hour. In 1914 the same journey took about 8 hours. The train only stopped at one intermediate station.

* * *

THE Canadian Pacific Railway sends a pamphlet giving details of a C.P.R. tour *de luxe* across Canada, leaving Liverpool on Friday, July 25, and returning on Thursday, September 11. From August 1 to September 3 will be spent in touring Canada, the arrangements providing for accommodation, travel and all other requirements throughout the period indicated. The journey will be made entirely by C.P.R. steamers, trains, &c. The pamphlet gives details of the arrangements, and the tour as a whole should appeal very strongly to any who are desirous of seeing Canada and who can devote the time indicated thereto. The inclusive fare is £199 10s., covering slight variation of accommodation. Further particulars will be supplied from the European head office at 62-65, Charing Cross, Trafalgar Square, London, S.W.1.

* * *

To accommodate the very large movement of "Mystic Shriners" (the famous transatlantic fraternal organisation) attending the Convention of that body in June next, the Canadian Pacific Railway will set up a city which will be appropriately known as "Fez City," fully equipped to receive a population of 8,000 people. A novel city it will be, too, for it will be composed mainly of sleeping cars with marquees for administration and service buildings. Altogether there will be 300 sleeping cars in "Fez City" besides numerous other cars for the help and for kitchen use and for baggage, linen, ice and fuel. "Fez City" will lie west of Bathurst Street, Toronto, and only about 200 yards from the Coliseum Building, on the Toronto Exhibition Grounds, where the General Convention meetings will be held, with the Imperial Council headquarters, in the Royal York Hotel. The refreshment marquee will be in charge of the Canadian Pacific Dining Car Department.

* * *

THE Reichsbahn summer time-tables, in effect on May 15, will reduce the running times on a number of important routes, and

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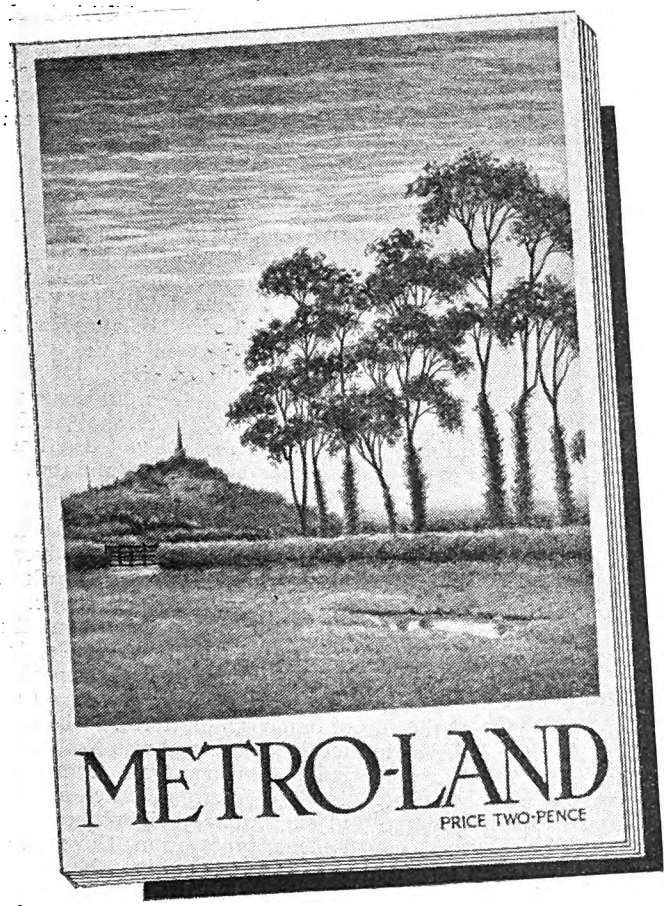

COVER OF "METRO-LAND" 1930, THE METROPOLITAN RAILWAY'S WELL-KNOWN ANNUAL.

also improve connections. One improvement will be the reduction of the running time between Berlin and Moscow from 47 to 38¾ hours, and between Moscow and Berlin from 48 to 37¾ hours. The route is *via* Königsberg and Dünaberg. The running time from Paris to Hamburg and Berlin will be cut down by 85 minutes and transit will be greatly accelerated on a large number of lines within the German borders.

* * *

An electric train equipped with S.K.F. roller-bearings was placed in traffic by the Metropolitan Railway on May 1 simultaneously with the intensification of the train service generally. Briefly summarised, the new service means more trains to and from the suburbs; a large increase in the number of through City trains; a revised service to Rayners Lane, Uxbridge and Watford between 10 a.m. and 4 p.m. and the re-timing of numerous other trains. Willesden Green is specially favoured, for no less than 72 extra-trains are provided for the benefit of local residents. Watford and Uxbridge are provided with increased travelling facilities as well as Rickmansworth, whilst a useful late train now leaves Baker Street on Sundays at 11.40 p.m. for stations Willesden Green to Uxbridge.

* * *

The L.M.S.R. and L.N.E.R. joint service to Zeebrugge will be resumed on June 21 and will remain in operation until September 15, sailings being twice weekly in each direction. For many years the service has been worked by the *Duke of Clarence*, but it will be operated this year by the steamer *Duke of Connaught*, a larger and more modern vessel. She will leave Hull (L.N.E.R. Riverside Quay) every Wednesday and Saturday at 6 p.m., returning from Zeebrugge every Monday and Friday at 6.30 p.m.

* * *

A new form of wheel centre for rolling-stock is being tested by the London "Underground" railways. The centre, which is made up of layers of wood, each comprising six or more sectors of a circle, is claimed by the inventor, a Mr. Lang, considerably to reduce running noise. If the experiments now being conducted at the Acton shops are successful, eight of these wheels will be tried under a coach on the Central London Railway.

* * *

The s.s. *Amsterdam*, which is the third of the three new luxury vessels for the L.N.E.R. cross-Channel services between Harwich and the Hook of Holland, made its maiden trip on April 26. The names of the other two vessels are the *Vienna* and the *Prague*. These three sister ships have been specially equipped for night travel, and are the largest and most luxurious of the cross-Channel steamers. Their gross tonnage is 4,220 tons, length 366 ft., and breadth 50 ft. They have all been built by John Brown & Co. Ltd., at Clydebank.

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On April 5, in connection with the International Association Football Match (England *v.* Scotland), at Wembley, sixteen trains were run to King's Cross and six to Marylebone, as follow:—

To King's Cross.		*To Marylebone.*	
From Scotland ..	9	From Scotland ..	2
,, Newcastle ..	2	,, Sheffield ..	2
,, West Riding	2	,, Manchester	1
,, Hull	1	,, Nottingham	1
,, Cleethorpes	1		
,, Gainsboro' .	1		

Eight of the trains from Scotland were worked by Pacific engines, seven stationed at Gateshead or Heaton Sheds, and one at Edinburgh. The trains had very satisfactory workings, two of them actually arriving at King's Cross before time. The loads were heavy, the heaviest being 490 tons.

* * *

The equipment of a train control office for the Darlington district has been authorised by the L.N.E.R., and accommodation is being provided in the offices of the District Superintendent.

* * *

The 7-day area season tickets introduced by the Southern Railway last summer proved such a great success that for the coming season the issue of these tickets will be extended to cover 12 different areas. The tickets, which cost 10s. 6d. third class (children under 14 half price), can be obtained on demand any day from now onwards until the end of October at any of the stations included in the scheme or at any London terminal station, and are available at all stations in the particular area "All-Island" ticket, covering all stations for 7 days, including day of issue. The in the Isle of Wight, costs 10s. 6d. first class and 7s. 6d. third class—children under 14 half price.

* * *

Mr. W. E. Floyd, of Birmingham, sends particulars of two instances of train loading, both with 4-6-0 locomotives, which, he suggests, represent very nearly the practicable extremes. In the one case, owing to delays, the 7.20 p.m. ex Euston arrived at Inverness after the Kyle of Lochalsh train had left. An eight-wheeled composite and a van were therefore placed on the Wick mail train to convey English passengers, mails and newspapers to Dingwall and beyond, and from Dingwall to Kyle of Lochalsh, a distance of 64½ miles, one of the now usual 4-6-0's worked these two vehicles as a special. The other instance was with an up night train leaving Crewe for Euston in bad weather, worke "Royal Scot" locomotive, and boo stop only at Rugby, the load consistin one six-wheeled fish van, three 12-w first-class sleepers, and no fewer thirteen 8-wheeled vans, third-class s and ordinary carriages.

* * *

Mr. G. H. Daventry sends some [illegible] on the various Cup Tie excursion spec which arrived at St. Pancras on the m ing of Saturday, April 26. These numb 29, coming from various towns in Y shire, Lancashire and the Midlands, w two from Glasgow. Thirteen of the tra were worked by 2-6-0's of the "130 class, 14 by compound 4-4-0's, and one an ordinary 4-4-0 No. 728. Several of trains arrived before scheduled ti Lateness in no case exceeded 25 minutes

* * *

Mr. T. A. Bacon writes:—"Great interest was aroused among travellers using Charing Cross station, S.R., on Saturday, April 26, when locomotives of the new Schools class made their debut on the Eastern section, and crowds of people, including many of the station staff, inspected one of the new engines which was drawn up at the end of number 5 platform. The particular locomotive concerned was No. E900, *Eton*, which had drawn a train (composed of eight standard corridor coaches, one Pullman and one ordinary eight-wheeler of the compartment type) from Dover and Folkestone. A sister locomotive, the second of this class, was attached to the other end of the train for the return journey. This was No. E901, *Winchester*."

* * *

"King Edward VII" writes:—"G.W.R. No. 4376 is now working with the outside steam pipe to the cylinders, as in the case of some of the 6300 class. Aberdare 2-6-0 engines are now using the tenders formerly allotted to the 2-8-0 ex-R.O.D. engines, and the following 2-6-0's have been noted therewith, Nos. 2611, 2653 and 2674, while there are one or two others. Commenting on the notes sent in by Mr. K. R. Vasey, which are published on page 418 of the current issue. I might mention that No. 4024 still retains her original boiler and cab, although the steam pipes from the boiler to the cylinder are the same as a Castle class. No. 4002 *Evening Star* has the outside steam pipes, but they do not admit steam through the frames, for they curve in again and enter the cylinder through the frames there. New 0-6-0 tanks to be seen in London include 7708 and 7709."

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W. WHITEHOUSE writes:—" With gence to ' 8280's ' notes *re* the Great ...n section locomotives, I have to state ...ll 4-4-0 and 4-6-0 types are being ...with ' one-piece ' cast-iron chimneys. ...e of the 0-6-0 tanks have been fitted North Eastern pattern chimneys, in-ng 7038 (J68 class) and 7196 and 7389 class). As far as I can ascertain, only Clauds of the original pattern are still ...ing with non-Belpaire boilers. They Nos. 8865, 8868, 8873, 8875 and 8881. ...y are class D14. All the rest of the ...0-8900 class have been rebuilt as ...s D15. Engines of this class now having ...r-Claud boilers are as follow:—8780-..., 8792, 8794, 8796, 8800, 8805, 8813, ...8/9, 8826/7, 8831, 8833/4, 8838/9, 8841, ..., 8845-8847, 8851-8853, 8856."

* * *

THE Institute of Transport announces that the Council has elected the under-named to take office at October 1, 1930:—

President.—The Hon. Sir Arthur Stanley, G.B.E., C.B., M.V.O.

Past-Presidents to Serve on the Council.—Sir Henry P. Maybury, G.B.E., K.C.M.G., C.B.; Colonel Sir Joseph Nall, D.S.O., T.D.; R. H. Selbie, C.B.E.; Roger T. Smith; Air Vice-Marshal Sir W. Sefton Brancker, K.C.B., A.F.C.; Sir Josiah C. Stamp, G.B.E.

Vice-Presidents.—A. L. Barber, R. Bell, C.B.E., Sidney E. Garcke, R. J. Howley, C.B.E., J. H. Follows, C.B.E., M.V.O., D. J. Owen.

Hon. Treasurer.—Sir Henry P. Maybury, G.B.E., K.C.M.G., C.B.

Hon. Solicitors.—Messrs. Joynson-Hicks & Co.

* * *

THE two new A.3 (Pacific type) engines, Nos. 2595 and 2596, recently received from Doncaster works, have been stationed at Gateshead shed. Both engines have the increased boiler pressure, *i.e.*, 220 lb., and No. 2595 is fitted with a new type of superheater, known as the " Long Loop " superheater.

* * *

WE regret to record the death on April 28, at 32, Romilly Park, Barry, of Mr. William Waddell, M.Inst.C.E., late Joint Chief Engineer of the Great Western Railway and formerly General Manager of the Barry Railway.

* * *

THE Belgian Marine Department some time ago put in hand a programme for the entire renewal of the fleet of steamers on the Dover-Ostend passenger and mail service. The scheme involves the construction of four vessels, the first of which, the *Princesse Astrid,* was put into commission on April 24. The other three vessels, the *Prince Léopold, Prince Charles* and *Princesse Joséphine Charlotte,* are to follow, most of them this year, and as they are brought into service the older ships will be withdrawn.

* * *

THE Canadian Pacific Railway has issued an attractive illustrated booklet describing a number of holiday tours organised to Canada for the coming summer months. The tours range from short inexpensive trips, taking in visits to Quebec, Montreal, Ottawa, Toronto, Niagara Falls, &c., to a Tour de Luxe to the Pacific Coast, when many of the chief beauty spots and places of interest in the Dominion will be visited. A copy of the booklet may be obtained post free on application to the Canadian Pacific Railway, 62-65, Charing Cross, London, S.W.1.

* * *

SMALL metal shields have been fitted to certain G.W.R. locomotives of the 2-6-2T type (4500 class) to prevent the steam from the whistle obscuring the cab windows.

* * *

No. 4000, the precursor on the G.W.R. of the 4-6-0 four-cylinder type (originally built as a 4-4-2), is now running as a " Castle " class locomotive. The Company has now a total of 134 locomotives of the four-cylinder type, including the 20 " Kings "—Nos. 111, *Viscount Churchill*; 4000 to 4099, 5000 to 5012, and 6000 to 6019.

* * *

THE Drummond four-cylinder 4-6-0 locomotives constructed for the old L. & S.W.R. (now S.R.) are in process of rebuilding. The alterations will entail removal of the large splashers and the fitting of a high running board, similar to the " 486 " class. No. 460E is the first locomotive of the type to be so treated. This engine is now fitted with a Wakefield mechanical lubricator for the coupled-wheel axle-boxes.

* * *

PUBLIC notifications of travelling facilities offered by the Somerset & Dorset Joint Railway now bear at the foot the words " By Order," in place of the name of a responsible official. The renumbering of the 80 locomotives on this line is still steadily proceeding. Blanks in the existing L.M.S. list are being filled according to the class of the types involved.

4-4-0's Nos. 77 and 41 have been renumbered 320 and 324 respectively in the L.M.S. stock and still retain the blue livery. The two 6 ft. coupled 4-4-0's Nos. 77 and 78 are at Bath, and the 5 ft. 9 in. coupled

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4-4-0's Nos. 15, 17 and 18, now 301-303, are at Templecombe. Both types are class "2P," as are also the 39-46 type 4-4-0's previously classed "3P 2G."

* * *

THE 0-6-0 saddle tank No. 1 has been renumbered 1500, a number previously borne by a Midland 0-4-0T. No. 1 has an interesting history. It was built in 1874 as a saddle tank, converted into a tender engine in 1888, and reconverted to a saddle tank in 1908. A similar engine, No. 8, was converted to a side tank, and later rebuilt as a tender engine. It was broken up in 1928. The saddle tanks are stationed at Bath, Radstock and Highbridge, and the 0-6-0 side tanks Nos. 19-25, which replaced the old Fowler or G.N. type 0-6-0's Nos. 19-24 in 1929, are at Bath, Radstock and Templecombe. Several of the 0-4-4T's will be given numbers in the 1200 series formerly borne by old Midland 0-4-4 well tank engines. The 2-8-0 mineral engines of the "80" class have been allocated numbers in the 9600 series.

The following were the numbers and types of the S. & D. engines at end of 1929:—Nos. 1-7 and 9, 0-6-0ST's; Nos. 10-13, 14A, 29A-31A and 52-55, 0-4-4T's; Nos. 14, 15, 17, 18, 39-46, 77 and 78, 4-4-0's; Nos. 19-25, 0-6-0T's; Nos. 34-38, 51 and 57-76, 0-6-0's; Nos. 80-90, 2-8-0's; and Nos. 101 and 102, 0-4-0T's, Sentinel type. The following have Belpaire boilers: Nos. 17-25, 34-46, 52, 53, 55, 57-66, 72-78 and 80-90. Nos. 39-46, 57-61 and 80-90 have superheaters.

* * *

MR. CECIL M. FURST reports that L.N.E.R. 4-6-2 locomotives are now working to Aberdeen. New 4-6-2's now in service include No. 2597 *Gainsborough* and No. 2595 *Trigo*. Thirteen trains left Edinburgh (Waverley) between 7.45 p.m. and 12.18 a.m. for London on April 5 in connection with the England *v.* Scotland International match, 11 of these being specials, of which nine went to King's Cross and two to Marylebone. "Notebook" sends notes of various English L.M.S. locomotives which worked to Scotland and Scottish locomotives which worked to England on the same occasion.

* * *

MR. F. W. HUTTON-STOTT points out that G.W.R. 4-6-0 No. 4024 *Dutch Monarch*, though fitted with outside steam pipes, does not carry a "Castle" class boiler, as suggested by Mr. K. R. Vasey.

* * *

NEW 2-6-0 mixed traffic engines recently turned out at Crewe are in service as follows:—Central Division (L. and Y. Section), Nos. 13166-9; Midland Division, Nos. 13170-2. Of those now under construction, No. 13178 will be the 6,000th engine built at Crewe. Further 2-6-2 passenger tank engines have arrived from the Derby works, Nos. 15505-12. The first four of this series, Nos. 15500-4, are stationed at Birkenhead North (Wirral Section). "Claughton" class engine No. 5905 "Lord Rathmore" is now running with boiler mountings cut down for the Northern loading gauge. "G1" class No. 9152 and "G2" class No. 9416 have been adapted for working over the Midland Division. No. 9052 is the latest "D" class 0-8-0 to be converted to "G1" class (superheater). N.S.R. engines recently withdrawn from service include "D" class 0-6-0 tank No. 1594 and "E" class 0-6-0 goods tender No. 8656. Another withdrawal of interest is No. 5092 "Violet" (old No. 763), one of the few remaining 6 ft. 2-4-0 "Jumbos."

* * *

A PARTY of exceptional size, numbering in all 1,500 boys of the Crusaders' Union, drawn from public schools in London and the Home Counties, was on April 28 taken by the Southern Railway to Southampton, and there conducted over the White Star liner *Olympic*, the floating dock, and other features of interest in and around Southampton Docks. The organisation had been prepared jointly by officials of the railway, and by our contributor, Mr. Cecil J. Allen, who is prominently associated with the Crusader movement. Two special trains were provided, composed in each case of the latest type of corridor stock, and the engines were both of the "Lord Nelson" 4-6-0 type, No. E860, *Lord Hawke*, and No. E862, *Lord Collingwood*. *Lord Hawke* carried on the smokebox front a large replica of the Crusader badge, and made non-stop journeys in both directions, on a 90-minute schedule, between Waterloo and Southampton Docks; particularly good running was made on the down journey, with a 13-coach train, weighing 416 tons empty and 455 tons full, when Basingstoke was passed in 53 min. and Winchester in 73 min., and, but for p.w. and signal checks, Southampton Dock Gates would have been reached in 85 or 86 min. The second train made intermediate calls to pick up contingents at Clapham Junction, Wimbledon, Surbiton and Woking. The successful and punctual carrying through of all the arrangements, including the provision of lunch and tea on this immense scale, reflects great credit on all those responsible, both at London and Southampton.

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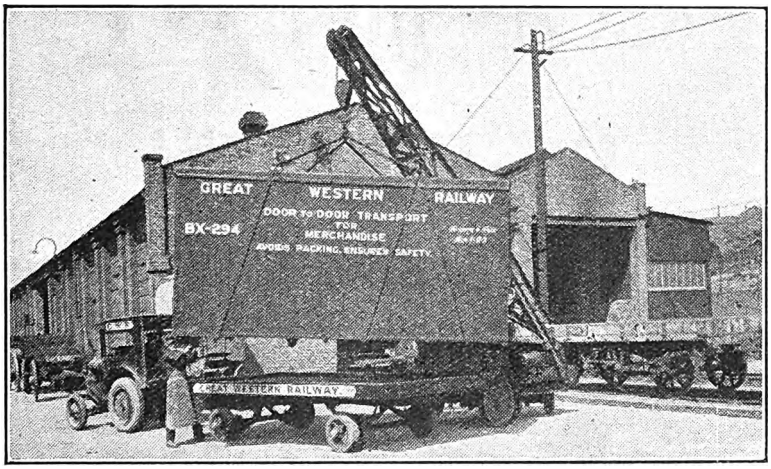

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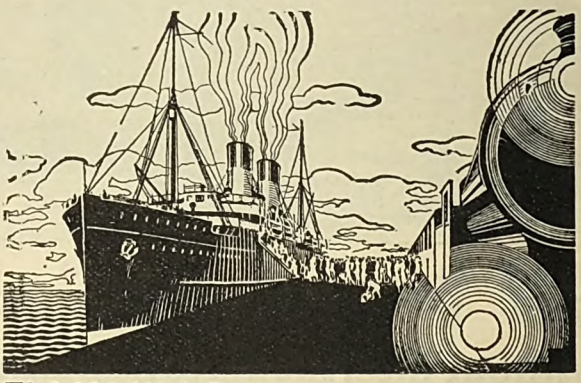

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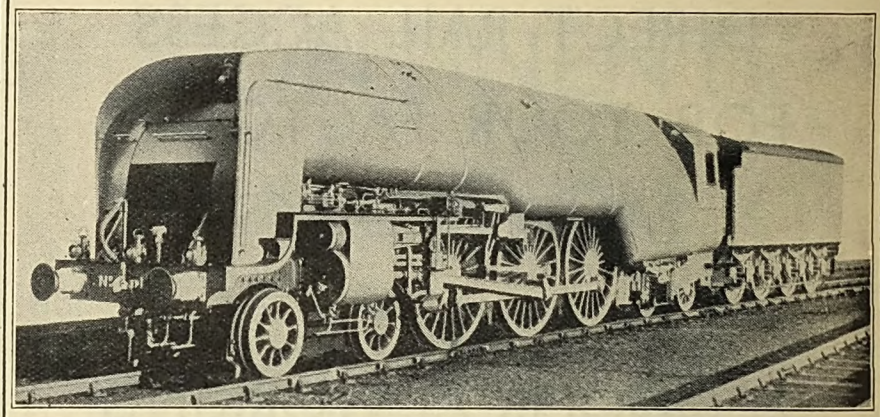

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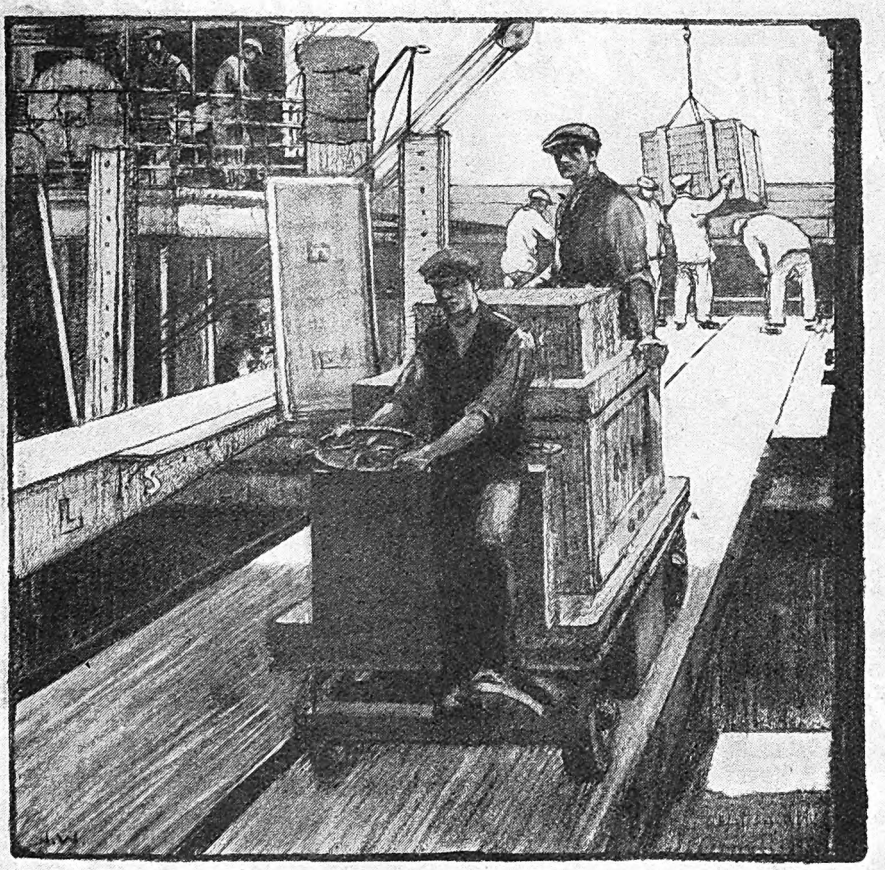

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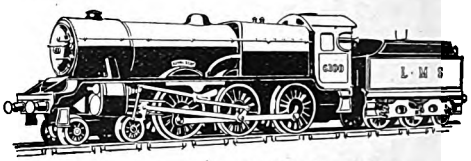

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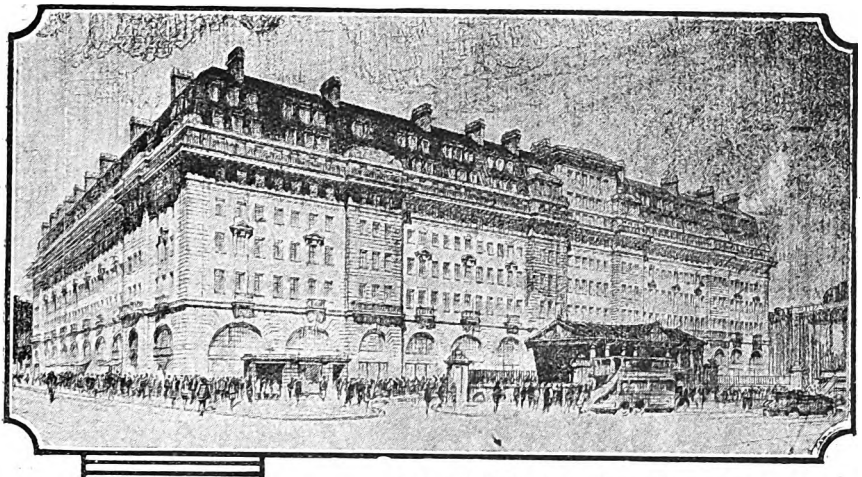

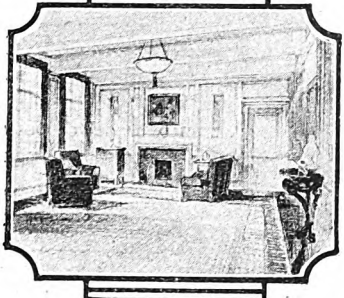

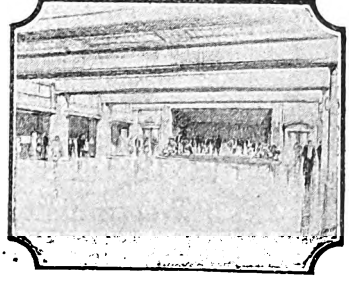

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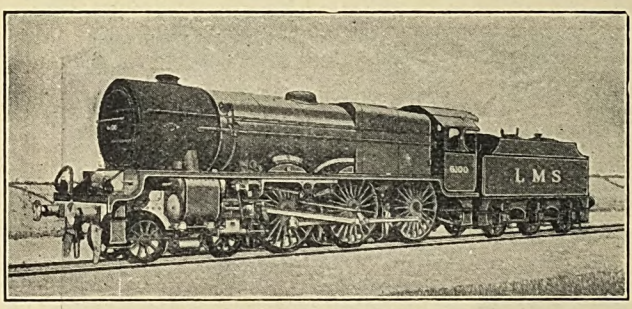

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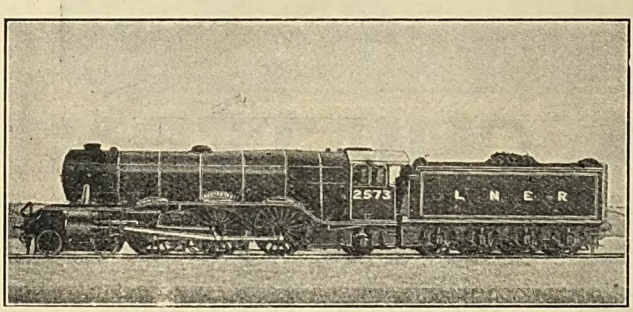

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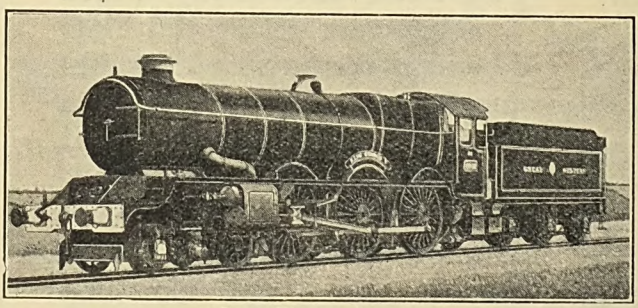

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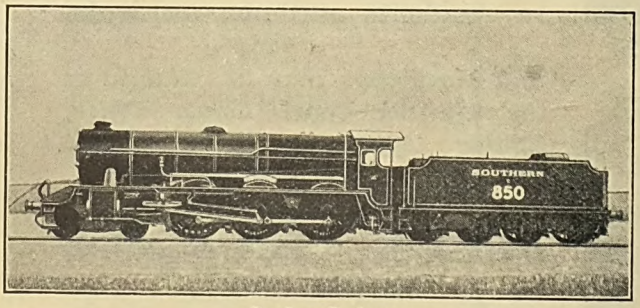

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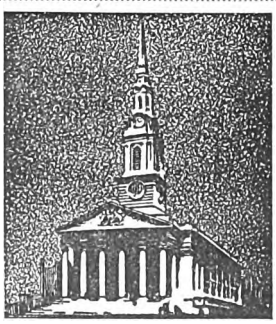

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